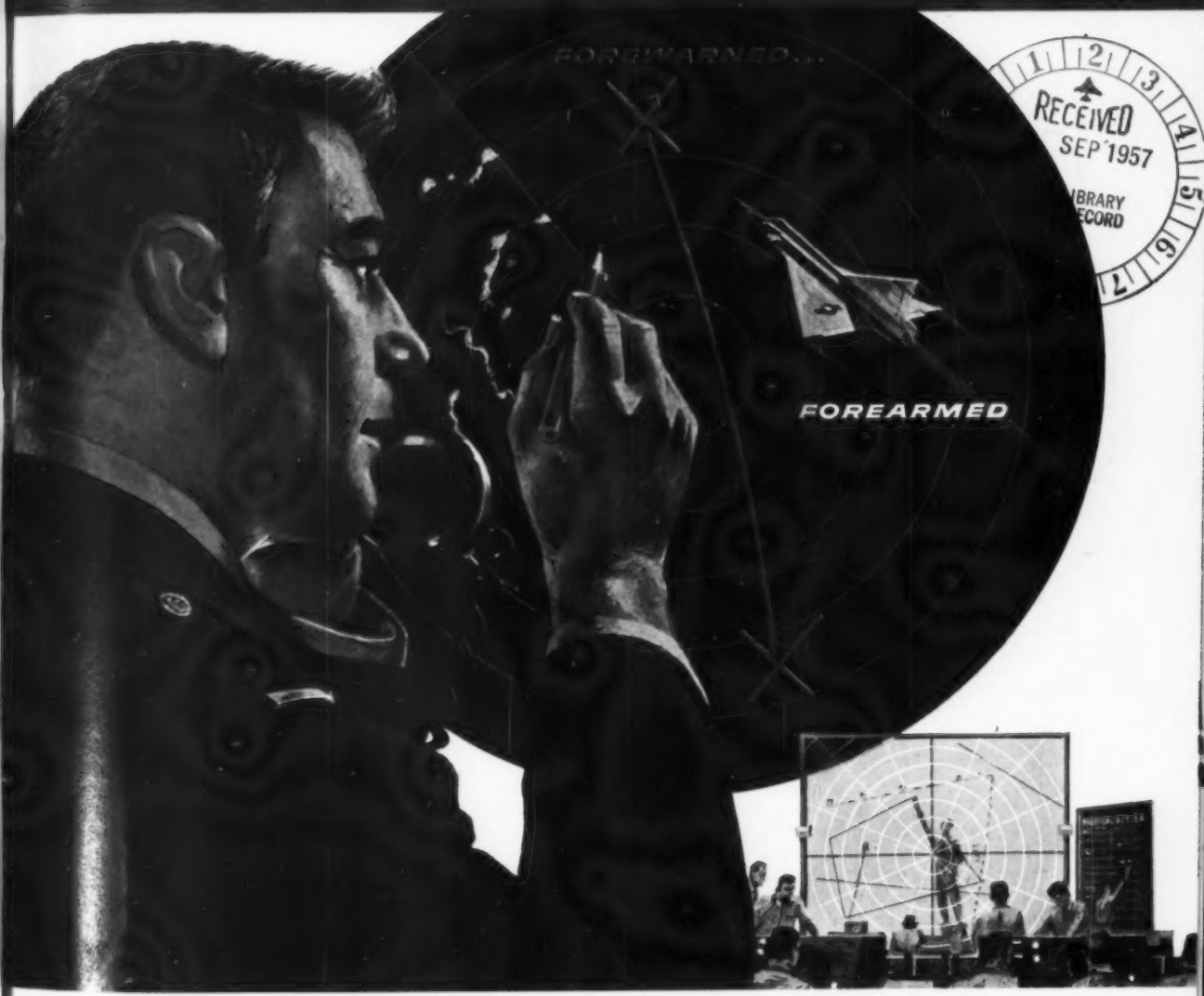
September 9, 1957
30 cents

Navy outlines plans for fiscal 1958 . . . Page 31
Westcott radiation-resistant electronics . . . Page 49
SAC drafts blueprint for jet operations . . . Page 79

AMERICAN AVIATION



RECEIVED
SEP 1957
LIBRARY
RECORD

FOREWARNED

The officers and men of the U.S.A.F. Aircraft Control and Warning, searching the heavens 'round the clock with radar, are the guiding hands behind America's air defense. Through their diligence, our Interceptors are *forewarned* and electronically directed to any unidentified aircraft.

FOREARMED

The pilots of the U.S.A.F. Air Defense Command are *forearmed* with advanced weapons systems like Convair's supersonic F-102A all-weather delta Interceptor. From the ground up, this formidable air defense team is keeping an eye on your freedom!

CONVAIR

A DIVISION OF GENERAL DYNAMICS CORPORATION

THE VITAL DIFFERENCE

These patented Fluoroflex®-T hose assemblies are truly fireproof

Leakproof, blowoff-proof fittings contribute to optimum fire safety

FLUOROFLEX-T:
Aviation's most advanced hose

The Original fluorocarbon hose

Patented tube compound

Greater flex life

Millions of feet in service

Over three years flying time

Superior impulse life

Leakproof, blowoff-proof fittings

Self-supporting pre-formed assemblies

Reliability of patented Fluoroflex®-T fireproof hose assemblies is assured because: 1) patented tube withstands higher temperatures than previously used materials; 2) assembly is fully protected by the special impregnated fireproof sleeving; and 3) just as vital, fittings are blowoff-proof.

Resistoflex's securely swaged couplings provide the safety factor which is the very minimum insurance that passengers and costly equipment should have for their protection. *These lines will not leak or spill fluids to cause or feed a fire.*

Years of service on all types of commercial and military aircraft have demonstrated the inherent reliability of this design.

Patented Fluoroflex-T fireproof hose assemblies are fully approved by CAA — have actually *surpassed fireproof requirements as tested by CAA.* The record speaks for itself — Fluoroflex-T hose assemblies truly insure optimum reliability for aircraft engines, frames and missiles.

VITAL FACTS ABOUT FLUOROFLEX-T

The core of all Fluoroflex-T assemblies is its specially compounded, patented tube. Many years of development were required to evolve and fully prove this tube, which now makes "The Vital Difference" in the plumbing of practically every modern aircraft and guided missile.

Continuous, rigid quality control methods and years of know-how guarantee the highest performance characteristics of Fluoroflex-T hose. Since the properties of products made of Teflon® can be varied greatly depending on the fabricating methods employed, the fabricator's experience and integrity remain the user's best assurance of reliability and performance. Send for data.

® Fluoroflex is a Resistoflex trademark, reg. U.S. Pat. off. ® Teflon is a DuPont trademark.

Originators of high temperature fluorocarbon hose assemblies

Resistoflex
CORPORATION

Roseland, New Jersey • Western Plant: Burbank, Calif. • Southwestern Plant: Dallas, Tex.

Circle No. 1 on Reader Service Card.

NEW ENGLAND

It's being shouted from the treetops...

The good news is: there's an exciting new airline aloft, a new business transport on the wing—the Fairchild F-27 *—the only airplane of its kind.*

Propjet-powered by twin airline-proven Rolls-Royce Dart engines, the F-27 outflies, outperforms any airplane of its type. It offers short hop economy to regional air carriers, 2250-mile range as a business transport. Cruising at 280 mph, it is unmatched by competitive airliners or executive planes.

Address inquiries to: R. James Pfeiffer, Executive Director of Customer Relations, Fairchild Engine & Airplane Corporation, Hagerstown 15, Md.

FAIRCHILD

F-27

THE FINEST AIRCRAFT FOR AIRLINES,

CORPORATIONS AND MILITARY SERVICES.

Prototypes of new special tools for installing Cherry Blind Rivets and Lockbolts are shown in the Cherry Research and Development Department.

Special Tools

for building tomorrow's aircraft being developed today by Cherry research

Higher speeds and operating temperatures of aircraft, missiles and rockets of the future demand fasteners with greater resistance to the stresses imposed upon them than ever before.

Installation of these high strength Cherry Rivets and Lockbolts* will require new special tools such as those now in the development stage in the Cherry Research and Development Department.

This activity—anticipating the needs of the aircraft industry and the military—is an old story with Cherry. For years, Cherry engineers and technicians have devoted themselves to a single objective—the production of better aircraft fasteners and the tools for installing them.

Tools for solving specific problems—tools for efficient production fastening—all are developed and produced in the Cherry plant at Santa Ana which is devoted exclusively to the production of fastening equipment for the aircraft industry.

For information on the most efficient fastening methods for your operation—write Townsend Company, Cherry Rivet Division, P. O. Box 2157-Y, Santa Ana, California.

*Licensed under Huck patents RE 22,792; 2,114,493; 2,527,307; 2,531,048; 2,531,049 and 2,754,703

CHERRY RIVET DIVISION

SANTA ANA, CALIFORNIA

Townsend Company

ESTABLISHED 1912 • NEW BRIGHTON, PA.

Circle No. 2 on Reader Service Card.

WAYNE W. PARRISH, Editor and Publisher

ROBERT H. WOOD, Editorial Director

JOSEPH S. MURPHY, Executive Editor

ALBERT W. BENTZ, Managing Editor

ERIC BRAMLEY, Chief News Editor

WILLIAM V. HENZEY Transport	WALLACE I. LONGSTRETH Cargo
HENRY T. SIMMONS Military	GEORGE R. SHAW, JR. Airports, Business Aircraft
LOIS C. PHILMUS Military	MARY L. MILLER Rates & Tariffs
WILLIAM O'DONNELL Manufacturing	DeWITT BALLEW Business News
ANTHONY VANDYK International	BERNARD BROWN Copy Desk
HENRY P. STEIER Electronics Engineering	CLIFFORD ALLUM Editorial Assistant
WILLIAM BELLER Aero Engineering	JEAN-MARIE RICHE Paris
SEABROOK HULL Aerophysics	JAMES H. STEVENS London
ERIK BERGAUST Missile Engineering	SELIG ALTSCHUL Contributing Financial
CHARLES SCHAEFFER Congress	S. P. SAINT Contributing Operations
DONALD FREDERICK Civil Aeronautics Board	WILLIAM H. MARTIN Art
FRED S. HUNTER West Coast	JOHN WALEN Production
RICHARD van OSTEN West Coast	ARTHUR J. NEWFIELD Director of Marketing
KEITH SAUNDERS News Analysis	ARAX ODABASHIAN Librarian

LEONARD A. EISERER, General Manager

M. MICHAEL CERICK, Advertising Sales Manager

EDITORIAL OFFICES: 1001 Vermont Ave., N. W. Washington 5, D. C. U.S.A. Phone: Sterling 3-5400. Cable AMERAV. Advertising Offices: 17 East 48th Street, New York 17, N. Y., U.S.A. Phone: Plaza 3-1100.

BUSINESS OFFICE . . . Larry Brettner, Circulation Director; Geneva C. Kinnaird, Circulation Fulfillment Manager; Ellen P. Coakley, Advertising Service Manager.

REGIONAL OFFICE . . . New York City: 17 East 48th St., New York 17, N. Y. M. Michael Cerick, advertising sales manager; Robert Weston, and Frederick W. Pratt, regional advertising managers. Phone Plaza 3-1100. **West Coast:** 8943 Wilshire Boulevard, Beverly Hills, Calif., Fred S. Hunter, manager; John Ball, Jr., regional advertising manager. Phone: Bradshaw 2-6561, and Crestview 6-6605. **Canada:** Allin Associates, 12 Richmond Street, East Toronto, Ontario. Phone: Empire 4-2001, Allin Associates, 1487 Mountain Street, Suite 4, Montreal, Quebec. **Chicago:** 139 N. Clark St., Chicago 2, Ill. Laurie S. Seward, regional advertising manager. Phone: Central 6-5804. **Miami:** International City, 4471 N. W. 36th Street, Miami, Florida. Richard A. Worthington, regional advertising manager. **Detroit:** 201 Stephenson Bldg., Detroit 2, Mich. Phone TRinity 5-2555. Kenneth J. Wells, regional advertising manager. **Cleveland:** Hanna Bldg., Room 1046, 1422 Euclid Avenue, Cleveland, Ohio. Phone PRospect 1-2420. Douglas H. Boynton, regional advertising manager. **London:** The AAP Company, 17 Drayton Road, Boreham Wood, Hertfordshire, England. Phone ELStree 2688. Cable Address: STEVAIR, London. **Paris:** Jean-Marie Riche, 11 Rue Condorcet, Paris (9e). Phone TRU 15-39.

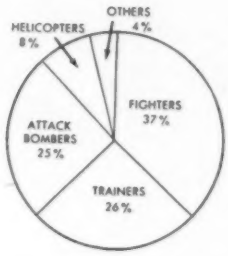
PUBLISHING INFORMATION . . . Published: Every other Monday by American Aviation Publications Inc., Washington, D. C. Printed at The Telegraph Press, Harrisburg, Pa. Entered as Second Class Matter in Washington and Harrisburg. **Subscription Rates:** For U.S. and Canada—$5.00 for 1 year; $8.00 for 2 years. Other countries—$7.00 for 1 year; $12.00 for 2 years. Subscription limited to aviation industry personnel. **Incorporates:** Airports and Air Carriers; Aviation Equipment; The American Pilot; Aviation Sales & Service; U.S. Aviation; and American Airports. All rights to these names are reserved. **Change of Address:** Send old address (exactly as it appears on mailing label on your copy of magazine) and new address including zone number if any to American Aviation, 1001 Vermont Avenue, N.W., Washington 5, D. C. Allow two weeks for changeover.

BPA NBP

SEPTEMBER 9, 1957—VOL. 21, NO. 8

AMERICAN AVIATION

WORLD'S LARGEST AVIATION PUBLISHERS

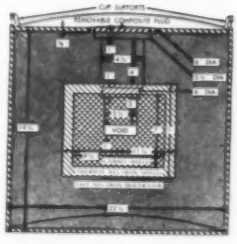


Navy to spend most money for fighters

Biggest slice of Navy's aircraft orders in 1958 will go for fighters (37%), Military Editor Lois C. Philmus says in report on service's plans for fiscal 1958. Other spending plans include trainers (26%) and attack bombers (25%). See page 31.

How Army improved performance of H-37A

It took a 1,000-hour, 'round-the-clock series of tests to compress three years' experience into six months, but Army did it to step up performance of Sikorsky H-37A copter. See page 33.



Electronic systems that will resist radiation

That's what the Air Force wants badly, says Engineering Editor William Beller in a technical analysis of some of the problems of potential nuclear warfare. Such systems might prevent radiation damage to air and ground defenses, he says. See story, page 49.

UAL drafts blueprint for DC-8 service

United Air Lines has set up a Turbine Aircraft Coordinating Committee that meets monthly to try to anticipate every need of jet age operations. Vice President J. A. Herlihy looks over report from W. C. Mentzer, general manager-engineering. Story by Fred S. Hunter, page 79.

Contents

TRENDS, DIGEST, BUSINESS

Airtrends 21
Digest 22
Transport Trends 89
Industry 90

INDUSTRY ROUNDUP

Navy's plans for 1958 31
Commercial C-130 carries 45,000 lbs. ... 34
Piper gets keys to 45,000th plane 40
Latest lineup at CAA 46
How DC-6A was salvaged 67

MILITARY

'Round-the-clock tests improve H-37A ... 33

CONGRESS

House probers ask investigation of ATA .. 37

FINANCIAL

Trunklines face crucial financing problems 43

ENGINEERING

Wanted: nuclear-resistant electronic systems 49

ELECTRONICS

Bigger role ahead for electronics 59

AIR TAXIS

Avalon flies 60,000 passengers yearly 63

BUSINESS FLYING

Civil aviation booming, CAA figures show 64

TRANSPORT

UAL drafts blueprint for jet operations ... 79
Coach-air service between London & Paris 82
Viscount promotion pays off for Capital .. 83

DEPARTMENTS

Personal View 9
Letters 19
When & Where 19
Spotlight 26
Contracts, facilities 66
International Aviation 71
New Products 73
Transport Commentary 85
Sam Saint Says 87
Sidelights 95
West Coast Talk 96
Airline Statistics 102
People 104
Books 109
En Route 110

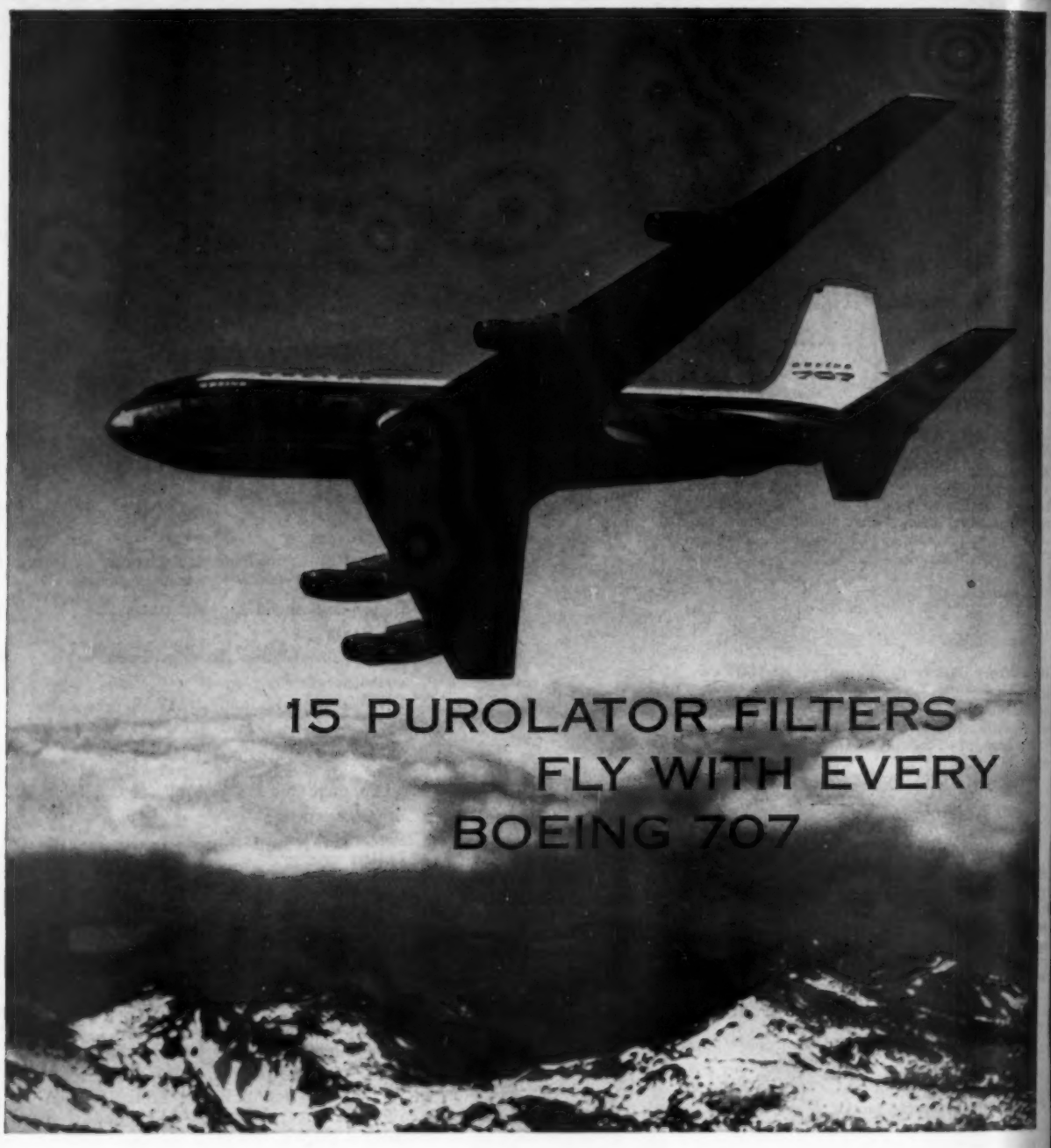
PHOTO CREDITS

World Telegram & Sun, p. 67; Aviation News Pictures, p. 67; New York Times, p. 67; United Air Lines, p. 80; J. S. Markiewicz, p. 82; C. J. Allum, p. 95.

63,000 Copies of This Issue Printed.

Copyright 1957 by American Aviation Publications, Incorporated.

Two years ago Capital Airlines switched to turboprop Vickers Viscount . . . How well the Viscount has paid off for Capital is disclosed in an AMERICAN AVIATION survey showing that Capital led five major scheduled airlines in traffic gains recorded in July 1957 as compared with July 1956, carrying 42.5% more revenue passengers and flying 59.5% more passenger-miles. Story by Anthony Vandyk, page 83.



The Boeing 707 is America's first jet transport. Performance is so outstanding that 11 airlines already have ordered 707's.

Effective filtration is essential on the 707 just as it has been on all aircraft for the past 25 years. Fifteen Purolator Micronic filters ensure that fluids move freely, and give optimum performance, by filtering out sub-micronic particles of foreign matter . . . particles that could cause serious trouble in a jet transport going 600 miles an hour.

With filtration such a must in any aircraft built today . . . or planned for tomorrow . . . there's no reason to settle for anything less than Purolator.

For every vital fluid used in aircraft . . . fuels, lubricants, hydraulic fluids and air . . . nothing performs better than a standard Purolator filter. The same will hold true when new needs arise. All fluids need filtration. And none need get along without the extra margin of reliability of Purolator filtration.

Filtration for Every Known Fluid

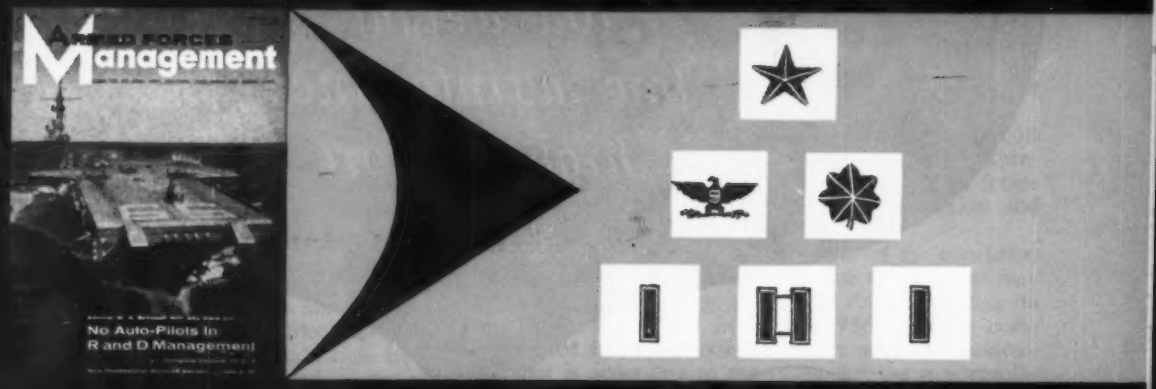
PUROLATOR

PRODUCTS, INC.

RAHWAY, NEW JERSEY AND TORONTO, ONTARIO, CANADA

Circle No. 3 on Reader Service Card.

TO REACH ALL LEVELS OF THE MILITARY MARKET



TELL YOUR STORY IN ARMED FORCES MANAGEMENT MAGAZINE —AN AMERICAN AVIATION PUBLICATION

BLANKETS PURCHASING ECHELONS IN EACH OF THE FIVE SERVICES
More than 94% of the subscribers to ARMED FORCES MANAGEMENT are executives in the Armed Forces. Of 20,000 circulation, 5,700 go to the Army; 5,000 to the Navy; 5,500 to the Air Force; 1,100 to the Coast Guard and 1,500 to the Marine Corps. 1,200 copies go to companies interested in military procurement.

PREVIEW OF FUTURE ISSUES
ARMED FORCES MANAGEMENT will carry articles and features giving a complete picture of the military world. The themes will be . . .

NOVEMBER	. . . This Is The Dept. of The Navy
DECEMBER	. . . This Is The Dept. of The Air Force
JANUARY	. . . Research & Development
FEBRUARY	. . . Dept. of Defense Budget Issue
MARCH	. . . Logistics
APRIL	. . . Atomic Capabilities
MAY	. . . Testing & Proving Grounds
JUNE	. . . Properties and Installations

ARMED FORCES MANAGEMENT IS NOT JUST ANOTHER MILITARY MAGAZINE . . . IT'S THE AUTHENTIC WORKBOOK OF THE MILITARY

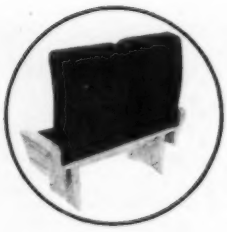
ERICAN AVIATION PUBLICATIONS
UTIVE OFFICES: 1001 VERMONT AVE., N.W., WASH. 5, D.C.
ERTISING OFFICES:
NEW YORK: 17 EAST 48TH STREET—PLAZA 3-1100
MIAMI: INTERNATIONAL CITY, 4471 36TH STREET, N.W.—TUXEDO 7-6658
CHICAGO: DWIGHT EARLY AND SONS, 100 NORTH LASALLE STREET—CENTRAL 6-2194
WEST COAST: ROBERT E. CLARK COMPANY, 6000 SUNSET BOULEVARD, HOLLYWOOD—HOLLYWOOD 3-1515
CANADA: ALLIN ASSOCIATES, 12 RICHMOND STREET, EAST, TORONTO—EMPIRE 4-2001
ALLIN ASSOCIATES, 1457 MOUNTAIN STREET, MONTREAL—HARBOUR 6898
OTHER AMERICAN AVIATION PUBLICATIO
AMERICAN AVIATION MAGAZINE • MISSILES A ROCKETS • AVIATION DAILY • WORLD AVIATI DIRECTORY • AIRCRAFT YEAR BOOK • AVIATI FACTS AND FIGURES • AIRPORTS • WHO'S WHO WORLD AVIATION • OFFICIAL AIRLINE GUIDE: NO AMERICAN EDITION, WORLD-WIDE EDITION • AIR CAR AIR TRAFFIC NEWS • AIR INFORMATION DIVISI

the world's largest manufacturing facility for aircraft seating ... for aircraft interior equipment

the T-34* seat

low cost
low weight
low maintenance
high comfort

Quantity Prices even on Small Orders



*TOURIST CONFIGURATION
34-INCH PITCH

Here's the Weber designed High Density Passenger Seat ... choice of airlines as most sensible, space-saving, weight-saving, cost-saving aircoach seat. Fits all Douglas and Lockheed series and numerous others. Because of standardization of jigs, dies and hardware items, Weber can pass along savings that make possible "Production Prices" on even the smallest orders ... with individuality retained in fabrics and special appointments. Prompt delivery assured! For details contact Weber today.

a World of experience in: Pilot and crew seats, ejection seats, passenger seats, buffets and lavatory units.

WEBER AIRCRAFT CORPORATION
a subsidiary of Weber Showcase and Fixture Company, Inc.
2820 ONTARIO STREET, BURBANK, CALIFORNIA

PERSONAL VIEW

'Realistic Scheduling' is Quite Unrealistic

FEW CAB ACTIONS in recent years have been more unrealistic than the "realistic scheduling" regulation which is being forced on the airline industry effective September 20.

It solves nothing for the traveling public or the airlines. It simply creates new problems and added expenses which defy estimation at this time.

Briefly, the rule (Part 234 of CAB's Economic Regulations) subjects airlines to criminal liability when they fail to complete at least 75% of flights within 15 minutes of the block-to-block time published in their schedules. All passenger flights of U.S. trunk and local service carriers conducted within the continental boundaries are embraced.

Basis for the new rule, CAB said, is the "growing number of complaints of poor schedule performance." Significantly, CAB did not relate the growing number of complaints to the growing number of passengers carried. It is highly doubtful if the percentage of such complaints to total passengers establishes the "need and desirability" of the regulation as CAB alleges.

Be that as it may, the new rule does nothing even for the complaining passengers. Block-to-block time to be used will be the total inflight time from origin to final destination without regard to ground time at intermediates.

It matters not whether the service to intermediate points is on-time or whether there is a two- or three-hour delay on the ground at each of the intermediates.

It is a fairly safe assumption that the passenger who is now complaining to CAB will never be aware the regulation is in effect from any direct benefits he will receive.

On the other hand, if added expenses further increase the need for higher fares; if airlines are forced to cancel flights to avoid criminal liability in certain cases; if abuses are created which didn't before exist, then the adverse effect will be the only testimony that CAB has enforced a "realistic scheduling" rule.

The airlines have no idea yet how many persons will have to be employed to keep the new records required. If scheduled times of the majority of flights have to be lengthened to reflect delays on a minority of the flights, utilization figures will be affected and, perhaps additional aircraft will be needed to accommodate the same number of passengers. This, of course, would necessitate hiring additional flight crews and other personnel.

We wonder how CAB's mail rate people will react when a local line files for higher subsidy to cope with increased expenses stemming from the "realistic scheduling" rule.

We wonder too if CAB is not aware that its attempt to enforce realistic scheduling by Governmental edict could play an important role in future bargaining sessions between the pilots' union and the airlines.

Meanwhile, the very issuance of the regulation without affording parties a chance to comment may be illegal. There was a so-called draft regulation on this subject issued in April, 1956. Airlines commented and CAB took the matter under advisement. That is according to the rules. But the new regulation raises problems on which the industry has not had a chance to comment and that is not according to the rules.

This fact, plus the arbitrary nature of the 75% figure advanced, may well be grounds for court action. Perhaps CAB anticipated this when it closed the new rule with this statement:

"If any provision of this part . . . is held invalid, the remainder of the part . . . shall not be affected thereby."

CAB would be on much more solid ground if it took another long look at this problem before enforcing an arbitrary rule that does nothing for the public and could seriously detract from airline operating efficiency.

The Great Soviet Publicity Splurge

IF ALL GOES WELL with the venture, the Russians will score a great propaganda and publicity advance with the flying of the Tu-104 jet transports to New York this month.

Considering the early press treatment being given in the U.S., the American public will begin to believe, if indeed it doesn't already believe, that the Soviets are far ahead of the U.S. in jet transport and have achieved something which the U.S. and the west have been incapable of achieving.

Several press articles in August referred to the U.S. aircraft industry being "envious" of the Russians.

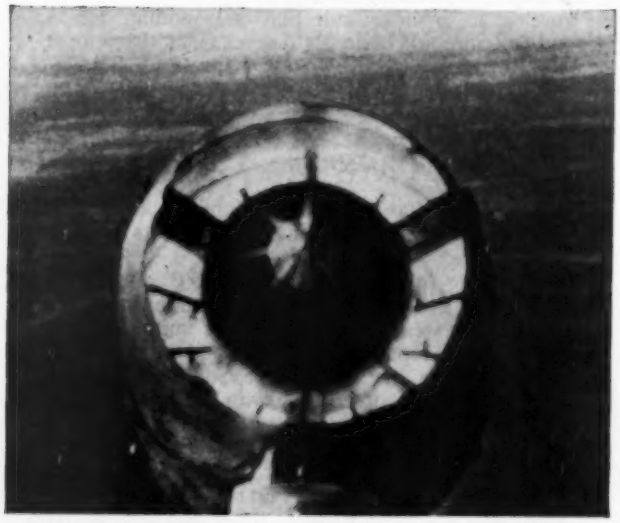
One can't blame the Russians for capitalizing on their pet liners and grabbing off a lot of prestige, but the attitude of the American press is quite astonishing. Either the press is entirely ignorant, or the U.S. industry has failed to do a proper educational job. The implications in the press articles are quite inexcusable.

Giving full marks to the U.S.S.R. for the Tu-104, the idea that such airplanes couldn't have been built in the west some years ago is quite ridiculous. The Tu-104 represents no technical achievement or superiority on the part of the Soviet Union other than initiative in proceeding with the building of inefficient and costly operating units. Why the aircraft industry in the U.S. should be "envious," as one *New York Times* and one Scripps-Howard writer wrote, is quite a mystery. For many years the western press has been Russia's finest publicity medium and early press treatment of the planned Tu-104 flights to New York is no exception.

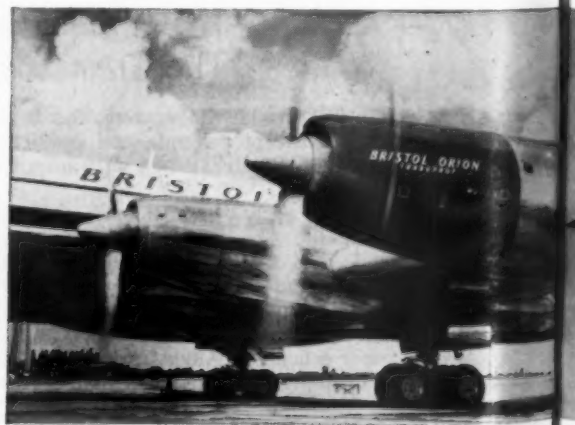
Wayne W. Parrish

POWER FOR
OF THE WO

The new Bristol Britannia — powered by 4 Bristol Pro[illegible] jet-prop engines—is now in service on BOAC routes spanning [illegible] continents. In a matter of months she will be the first jet age gia[illegible] US service on Northeast Airlines' routes.



The Bristol Thor ramjet produces great power at high Mach numbers in the upper air. Thor-type ramjets power the Bristol/ Ferranti Bloodhound surface-to-air missile, newly adopted as the mainstay of UK air defence.



World's first supercharged turboprop, the new Bri[illegible] Orion delivers full take-off power at all elevations up to 15,000 ft [illegible] at all temperatures. It is a unique achievement that will have a p[illegible] found influence on commercial aviation.

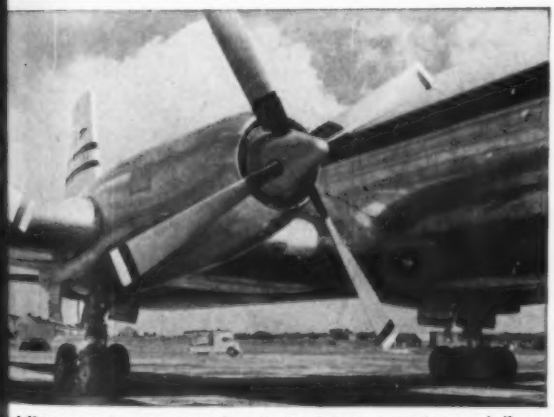
THE WINGS

RLD

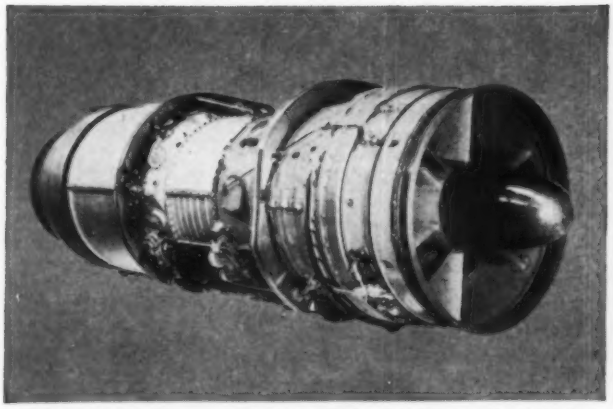
The brilliant new Britannia is only a part of the Bristol story

other part is to be found in the design offices, oratories, and production shops of Bristol Aero-gines Limited. Here, for nearly forty years, Bristol signers have been producing power for the wings of world. Power for defence. Power for civil air nsport.

BRISTOL
Aero-Engines
BRISTOL · ENGLAND



rld's most economical turbine engine, civil or ary, the Proteus free-turbine turboprop delivers 4,120 hp. It is widely renowned for its flexibility of operation, unique quietness utmost reliability.



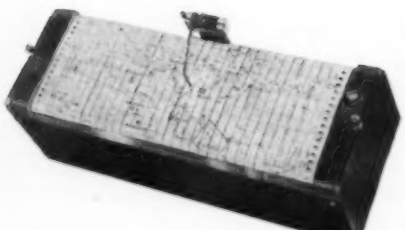
Bristol Olympus—world record-breaking turbojet. The Olympus, holding the world altitude record for turbojet engines, has been type tested at 16,000 lb thrust—more powerful than any other type-tested engine.

der in the lightweight field—the Orpheus, here ring the Folland Gnat, delivers more thrust for its weight than other type-tested engine. The Orpheus has been developed for weight fighters, trainers and executive aircraft.

The Jupiter nine-cylinder radial of 1920 was the first Bristol engine and, at the height of its long career, was being built under licence in 16 different countries. The aircraft shown here is a Bristol Bullet.

TRACKS IN THE SKY

. . . with the Bendix-Decca Area Coverage Navigation System



The actual position of the aircraft is continuously traced on the Flight Plotter—a moving road map of extreme accuracy.

In California in 1941, when two midwesterners invented a new navigation system, they didn't dream how much "growth potential" it had. Today that system is not only the most thoroughly proven navigation system in the world, but recent developments combine to give it outstanding air traffic control capability.

The Bendix-Decca system permits maximum utilization of air space at all flight altitudes — along airways or in terminal areas. It continuously shows instantaneous position location to the pilot, *with precision never before approached,* thus permitting minimum track separation, so essential to effective air traffic control.

Fixed wing aircraft and helicopters can maintain holding patterns with absolute accuracy and can feed into an approach system from any point with complete certainty.

Bendix
PACIFIC DIVISION
Bendix Aviation Corporation
NORTH HOLLYWOOD, CALIF.

LETTERS

Dissent and rebuttal

To the Editor:

Your recent editorial scoffing at the need for legislative restraints upon the service of liquor aboard U.S. air carriers should not go unchallenged.

The Air Line Stewards and Stewardesses Association has presented to the House Committee testimony and documented reports of its members, who are charged with the responsibility of serving alcoholic beverages in flight, that uncontrolled drinking constitutes an inherent danger to safe air travel.

Frenzied competition among airlines seeking to outdo each other in the drinking department makes it imperative that corrective action be taken beyond the mock gestures of self-imposed restraints. The abysmal failure of the airlines to police themselves, in this respect, conclusively demonstrates the need for protecting the traveling public and air crew employees through moderate legislative restraints.

Your inference that as a "so-called special interest" group we have some devious and undisclosed purpose in promoting this legislation is patently absurd. We have simply not been shown any effective or appropriate method for treatment of this pressing problem other than the adoption of such legislation.

You have suggested that "there are ways of handling the liquor problem" other than the avenue of relief we are pursuing. We would be interested in learning what these ways are: *Air Line Stewards and Stewardesses Association, ROWLAND K. QUINN, JR., President, Chicago.*

EDITOR'S NOTE. We heartily concur in opposing uncontrolled drinking on airplanes but were quite unaware that this is in issue at the moment. The issue is controlled drinking. No one has asked for uncontrolled drinking; the legislative proposals specifically seek to prohibit ALL drinking including controlled.

No airline permits uncontrolled drinking; if it does, then some steward or stewardess is violating the rules and the remedy would appear obvious. We concur that there could be better policing in a few specific areas, but we submit to Mr. Quinn that self-policing is the answer, not a federal John Barleycorn law that will lead to more and more abuses. . .

There is ample regulation NOW against UNCONTROLLED drinking. The UNCONTROLLED DRINKER is loaded before boarding or gets loaded from his own bottle en route. No new federal law will alter this; there are plenty of rules to cover this now. Meantime the mature, adult population that likes a light lift gets penalized.

In our opinion Mr. Quinn's letter only enforces our original stand, and overstates a case to the detriment of all concerned except advocates of the highly concentrated and highly regimented social state.

Mistaken identity

To the Editor:

In the July 15 issue of a certain well-known aviation publication, page 88, I strongly suspect that the individual pictured and identified as S. Wourghaft, IATA-Paris, is in fact Ken Luplow of a well-known aviation company located in the Northwest. *CARL M. CLEVELAND, Public Relations Manager, Boeing Airplane Co., Seattle, Wash.*

To the Editor:

In spite of your firm denial (to Mr. Carl M. Cleveland, Public Relations Manager for Boeing Airplane Company) that you might have been mistaken in taking a picture of Ken Luplow at the Paris Air Show and captioning it S. Wourghaft, for your "Paris Air Show personalities," I find it difficult to believe.

Nobody in the world could have the identical physical appearance, expression, and clothes of my husband.

How may we contact Mr. S. Wourghaft (IATA-Paris) to compare notes—and noses? Do you suppose he, also, has four little sons who look just like him?

Thank you very much. *MRS. KENNETH LUPLOW, Villa Port Bleu, Chemin de la Boucle, Vesenaz/Geneva, Switzerland.*

To the Editor:

Ken Luplow's wife's claim is, I am afraid, entirely correct! I must confess that I am not the gentleman shown on the photo. Could you please quiet, on my behalf, my very temporary wife? I am sending you enclosed one of my best photographs. *SERGE WOURGHAFT, Information Officer, IATA-Paris.*

WOURGHAFT

LUPLOW

EDITOR'S NOTE: All due apologies to Messrs. Cleveland, Luplow and Wourghaft, and certainly profuse apologies to the lovely Mrs. Luplow, for one of those photo mix-ups. Photo in July 15 issue was indeed Mr. Luplow, who runs the Boeing office in Geneva, Switzerland. And here is photo of Mr. Wourghaft, who was wandering around the Paris show the same day the Luplow photo was taken.

New kind of air show

To the Editor:

Re your comment in the July 29 issue of AMERICAN AVIATION about the absence of any civil aircraft display this year, we expect that on Oct. 11-12 we will have at MacArthur Airport (Islip, Long Island), as a part of an overall Exposition of Aviation and Industry, a good number of aircraft representative of the private and business fleet.

It is our intention to expose the public to this commercial market of aviation which has so long been overwhelmed by the sheer enormity of military aviation. In our area, as in many others, the concentration of military aircraft production and activity, linked with its tremendous international significance, has almost obliterated in the minds of many people the fact that there is any other type of aviation activity. This, in spite of the fact that over 1,000 registered aircraft on Long Island are designated for private and business use.

We, too, think that "the business and private aircraft market is the best thing on the horizon . . ." We think, in addition, that so long as the proponents of general aviation continue talking to themselves, general aviation, i.e., the practical use of aircraft by small businessmen and individuals, will not come of age. When private and business flying become "dinner table conversation," general aviation will have arrived.

For this reason, the show in October will be for the public. Not an air circus, and not restricted to, or directed to those in the business, but one step in bringing this whole realm of personal air transportation up close to the people.

There will, of course, be military participation in the show, as well as commercial air lines. Last year 1,700 people kept two Convairs flying from 10 in the morning until 5 in the afternoon, on sightseeing tours around Long Island. Many were first flights. This year we intend to monitor the flights to determine exactly how many.

Also last year, we featured a "Fashion Show" of new private and business aircraft, and the response by the general public was outstanding. Many were not aware that there were any private airplanes with a closed cabin. Other who had seen them from afar had no idea that there were airplanes within their reach economically. Most just never had the opportunity to get close enough to one to realize that flying an airplane was not just something that you read about other people doing.

The basic intent of the aviation segment of the show is to point up the significance of aviation—all phases—to the public.

Being consistent readers of En Route, we are aware of your "hobby" of visiting airports. We hope that interest will bring you soon to MacArthur. *JOSEPH C. GIACALONE, Chairman, MacArthur Exposition of Aviation and Industry, Islip, N.Y.*

EDITOR'S NOTE: Best wishes for a fine plan which can't help but succeed.

Not puzzled by puzzle

To the Editor:

In regard to "Can you solve this one?" in your "Sidelights" column of August 12.

Angle A = arc tan 3/8 = 20°32′ apprx.
Angle B = arc tan 5/2 = 68°12′ apprx.

88°44′, a deficiency of 1°16′, thus line *X-Y* represents air space, something we are all looking for these days. *G. R. JANAS, Capt. EAL.*

To the Editor:

Regarding the puzzle in the August 12 issue of AMERICAN AVIATION, the two patterns appear to have identical components but do not. A straight edge placed along the diagonal of Figure 2 shows that the triangular pieces are no longer triangular, but slightly "hump-backed," picking up area for the additional square. *D. V. HUDSON, JR., Humble Oil & Refining Co.*

WHY BE LIMITED IN YOUR CHOICE OF FLIGHT DIRECTORS?

Bendix offers your pilots a wide choice

To show the wide range and flexibility of Bendix* Flight Director Systems, let's assume an ILS approach situation in which the airplane, on a 20° heading, is in a 10° right bank with its nose on the horizon, but slightly above the glide slope. The Course Deviation Indicator (same on all Bendix systems) pictures actual and pre-set headings, TO-FROM indications, and position relative to ILS beams (or VOR radial). Now, let's see how attitude reference and command information are presented on three typical Bendix Flight Director Indicators.

BENDIX SERIES "300" SYSTEM

In this system the Flight Director Indicator presents computed roll and pitch commands. Sky and ground are represented on a sphere, as shown, and actual attitude is depicted by conventional airplane symbol. Secondary airplane symbol represents commanded attitude and, in this case, calls for nose-down, left bank maneuver. Command is satisfied when the two symbols coincide.

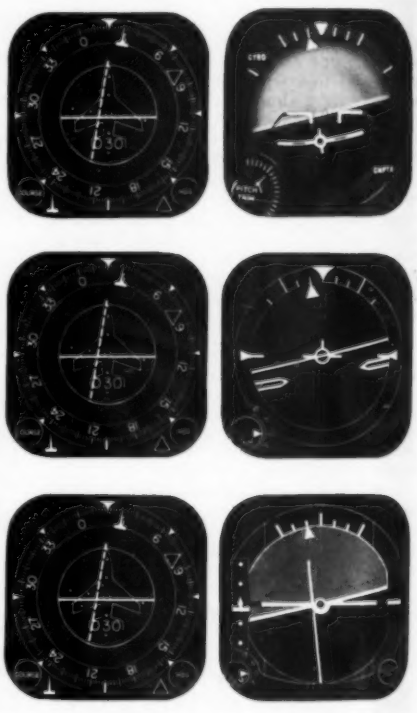
BENDIX SERIES "100" SYSTEM

This system's Flight Director Indicator also shows computed steering commands in both roll and pitch axes. Sky and earth presentation is flat rather than spherical, and white line represents horizon. In this version, the two pointed, opposing markers designate commanded attitude. Command is satisfied when wingtips of airplane symbol align with markers.

BENDIX SERIES "200" SYSTEM

The Flight Director Indicator in this system provides for computed steering commands in roll axis only. Flat gray and black areas represent sky and ground. Command bar is needle-like line extending up from bottom of indicator, and, in this example, calls for left turn. Commanded attitude is attained when this needle is straight up and down through center of indicator. Small horizontal bar's position with relation to vertical white dot scale along left edge shows whether airplane is above, below, or on glide slope beam.

COURSE DEVIATION INDICATOR | FLIGHT DIRECTOR INDICATOR



With Bendix Flight Director Systems you have your choice of several types of presentation . . . and your choice of a single- or two-axis system. You *don't* buy features you don't want or need. Yet, you get all the features and advantages that you *do* want and need. When you think of flight directors, think of Bendix. Get the Bendix story.

*REG. U.S. PAT. OFF.

District Offices: Burbank and San Francisco, Calif., Dayton, Ohio, Washington, D. C., and Seattle, Wash.
Export Sales & Service: Bendix International Division, 205 E. 42nd St., New York 17, N. Y.

Eclipse-Pioneer Division

TETERBORO, N. J.

Bendix AVIATION CORPORATION

Circle No. 6 on Reader Service Card.

COMPLETE

ONE-STOP

SERVICE

Here are the finest facilities in America for modifying and servicing your business airplane

To save you time, we provide performance modifications to speed your airplane and quick, efficient service to keep it always fit for flying. We engineer custom interiors that allow you to work as efficiently in the air as in your home office.

To insure your safety, we employ only the finest technicians and engineers and give them the best modification, service and test equipment available in this field.

Our customers include many of the most prominent industrial, commercial and professional organizations in the United States. For more specific information, please send for our free brochure.

THE GARRETT CORPORATION

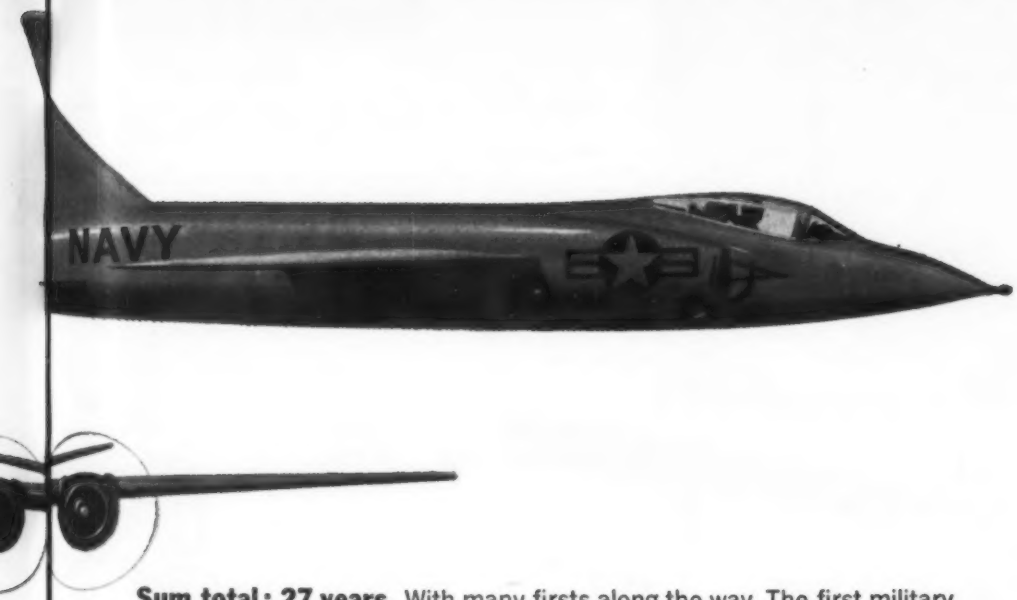
AiResearch Aviation Service Division

International Airport, Los Angeles, Calif. • Telephone: ORegon 8-6161

Conversion and Modification • Custom Interiors • Electrical and Instrument • Radio and Electronics • Engineering Service • Turn-Around Service

Circle No. 7 on Reader Service Card.

Circle No. 6 on Reader Service Card.



Sum total: 27 years. With many firsts along the way. The first military plane with retractable landing gear. The first carrier-based aircraft with folding wings. First swept-wing jets on operational service with carrier squadrons. First in the air with area-rule (coke bottle) fuselage for fighters. The first aircraft capable of performing the complete search-attack mission against subs. First in amphibians with the production of more such craft than the rest of the world combined. First with two-place transonic jet fighter-trainers.

Sum total: more than 24,000 planes. Ready in quantity when needed. At minimum cost to our government. And backed by unexcelled operational and maintenance field support throughout the world. Small wonder Grumman products have been in uninterrupted service every day of every year since 1930.

EXPERIENCE

GRUMMAN AIRCRAFT ENGINEERING CORPORATION
Bethpage • Long Island • New York

Air Superiority Fighters • Anti-submarine Aircraft • Jet Trainers
Air Transports • Nuclear Research • Aerobilt Truck Bodies
Hydrofoil Research • Grumman Boats

Circle No. 8 on Reader Service Card.

A Vought Vignette
NO. 5 IN A SERIES

Why the Missile Engineer Never Missed Mail Call

Vought's Regulus II missile took shape just a short walk from the desks of its developers. Engineers handled the new hardware and monitored tests in person — literally flying the big missile on the ground at Dallas. It was a convenient arrangement while it lasted.

Then a big USAF Globemaster landed and taxied to Vought's Experimental Hangar. The missile was winched aboard and airlifted to a desert site for flight tests. By nightfall there was a 1,000-mile rift between Regulus II and home base.

Joe Boston was ready to step into this gap. As Project Assistant for Field Liaison, he'd already equipped Vought's desert crew for extensive flight tests. Now he'd make sure that test data and hardware flowed uninterrupted from the desert to Vought. High-speed feedback of facts on one flight could influence the success of the next.

Mail from the desert poured in to Joe at Vought. From project men at the flight test site came parts for immediate rework and return. From the flight test crew's mobile ground station came rolls of telemetered brush records. From the recoverable Regulus itself, came packets of oscillograph data. And from Field Service — for repair or replacement — an occasional wrench or relay.

Joe served as clearing house and consultant. Flight data was reduced and released to design and support groups. It revealed not only missile performance, but the temperatures and pressures of a strange new environment. When data pointed toward design changes, Joe's time and cost estimates helped specialists reach decisions.

Thanks to Vought's fast overland relay of hardware and data, the records of one flight were decoded and digested in time to improve the next hop. Dividends in performance and reliability were obvious after six flights had been logged by Regulus II.

All six had been flown by one vehicle.

Chance Vought uses comprehensive testing and data analysis to assist the engineer through unexplored problem areas. Test facilities strengthen every phase of the development cycle, and procedures are aimed at feeding data quickly into the engineering process. For details on select openings, write to: C. A. Besio, Supervisor, Engineering Personnel, Dept. AA-5.

CHANCE VOUGHT AIRCRAFT

WHEN—WHERE

SEPTEMBER

Aircraft Div., American Society for Quality Control, annual conf., Mark Hopkins Hotel, San Francisco, Sept. 9-10.

USAF world-wide conf. of flying safety officers, Arrowhead Springs Hotel, San Bernardino, Calif., Sept. 9-13.

IATA annual general meeting, Madrid, Sept. 9-14.

ICAO Communications Div., 6th session, Montreal, five weeks starting Sept. 10.

American Society for Testing Materials, Pacific national meeting, Sheraton-Palace Hotel, San Francisco, Sept. 13.

USAF-aircraft industry conference on safety education, Santa Barbara, Calif., Sept. 17-19.

Pratt & Whitney operations maintenance forum, Airwork Corp., Millville, N. J. Sept. 19-20.

Franco-Italian aviation conference, Milan, Italy, Sept. 21-22.

ASME fall meeting, Hotel Statler, Hartford, Conn., Sept. 23-25.

Composite and joint meeting of IATA traffic conference, Miami, Sept. 24.

Air Freight Cartage Conference, Chicago, Sept. 24-25.

Aviation Spark Plug & Ignition Conf., Secor Hotel, Toledo, Sept. 24-26.

Airwork-Pratt & Whitney annual forum, Airwork Corp., Miami Villas, Miami, Sept. 27.

SAE Aeronautic meeting, Aircraft Production forum and Aircraft Engineering Display, Ambassador Hotel, Los Angeles, Sept. 30-Oct. 5.

OCTOBER

National Airports Conference, University of Oklahoma, Norman, Oct. 2-4.

National Business Aircraft Assn., 10th meeting and forum, Denver, Oct. 2-4.

International Northwest Aviation Council, annual convention, Palliser Hotel, Calgary, Canada, Oct. 6-8.

National Electronics Conference and Forum on electrical research, development and application, Hotel Sherman, Chicago, Oct. 7-9.

Triennial Inspection of the NACA Lewis Propulsion Lab., Cleveland, Oct. 7-10.

International Astronautical Federation, annual congress, Barcelona, Oct. 7-12.

Annual Airport Development and Operations Conference sponsored by N. Y. State Bureau of Aviation, Onondaga Hotel, Syracuse, Oct. 8.

International Union of Aviation Insurers, annual general meeting, Amsterdam, Holland, Oct. 8-11.

Society for Experimental Stress Analysis national fall convention, El Cortez Hotel, San Diego, Oct. 9-11.

National Noise Abatement Symposium, Armour Research Foundation, Sherman Hotel, Chicago, Oct. 10-11.

ASTA convention and world travel congress, Madrid, Spain, Oct. 13-20.

National Assn. of State Aviation Officials, annual meeting, Sun Valley, Ida., Oct. 16-18.

Canadian IRE Convention-Exposition, Automotive Bldg., Exhibition Park, Toronto, Oct. 16-18.

National Society of Professional Engineers, fall meeting, Grand Pacific Hotel, Bismarck, N. D., Oct. 17-19.

American Helicopter Society, annual western forum, Statler Hotel, St. Louis, Oct. 20-22.

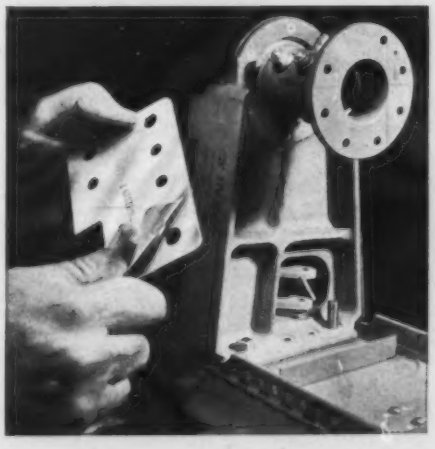
Aircraft Assembly Engineers prove it:

LAMINATED SHIMS OF

LAMINUM®

SURFACE BONDED... THEY peel FOR ADJUSTMENT

SAVE TIME! CUT COSTS!



With all laminations smoothly surface-bonded, LAMINUM looks and acts like solid metal, yet simply p-e-e-l-s for a thousandth fit—right at the job.

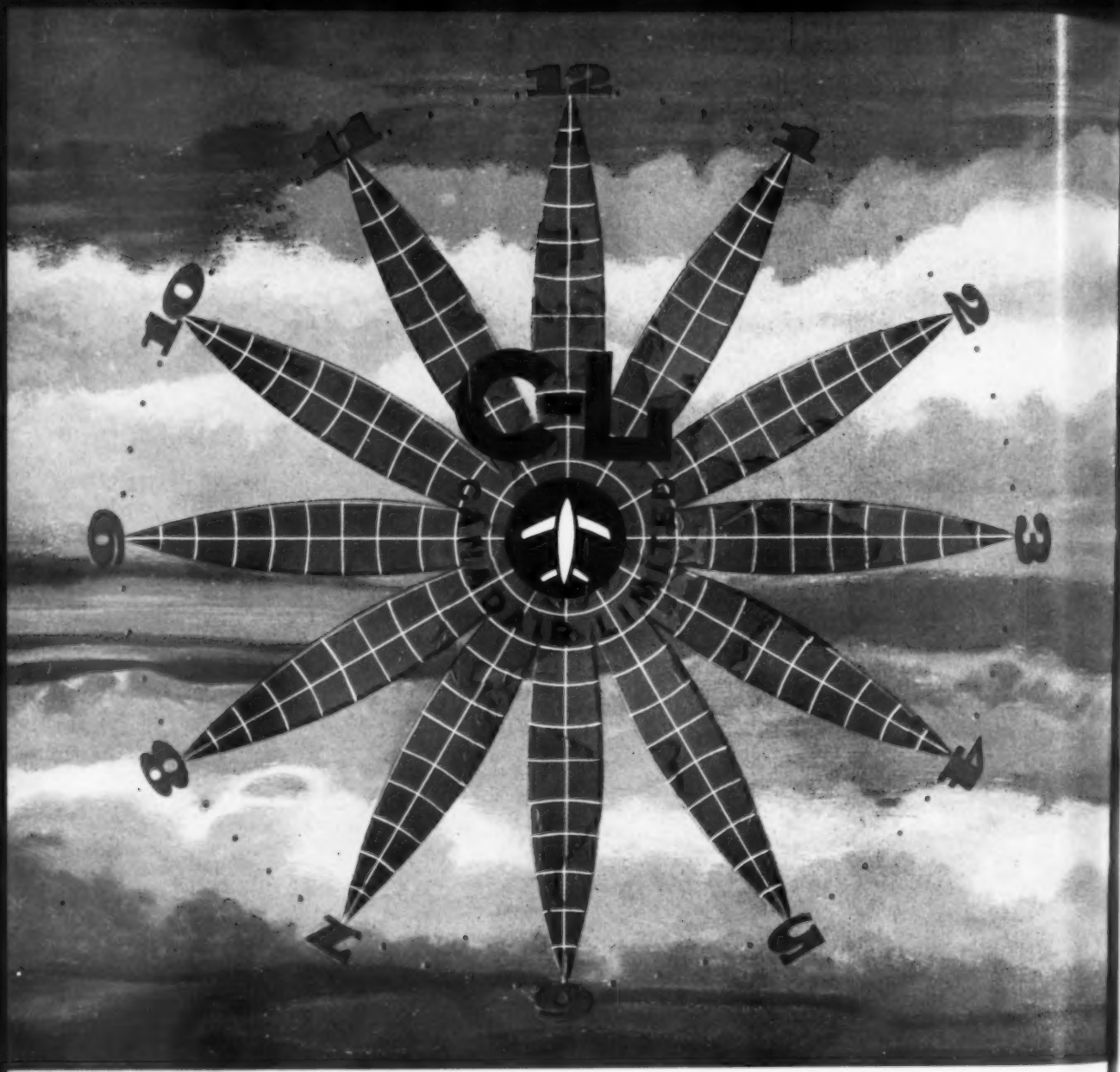
✓IN ALUMINUM
with laminations of .003"

✓IN STAINLESS STEEL
with laminations of .002" or .003"—also available in Mild Steel and Brass.

Newly published *Engineering Data File* contains detailed information. Write for your copy; there's no obligation.

LAMINATED SHIM CO., INC.
Shim Headquarters since 1913
5009 Union St., Glenbrook, Conn.

Circle No. 9 on Reader Service Card.



SPARE PARTS...ANYTIME...ANYWHERE

"For want of a nail a battle was lost..." The old saying has a special meaning in aircraft maintenance—so little unavailable can ground so mighty a machine.

Canadair has an enviable reputation in that Canadair-built aircraft fly—and fly—and fly, because sales service and *spare parts* are quickly available for Canadair customers anytime—anywhere.

Fifteen technical representatives strategically located in Europe, South America and South Africa—backed by a highly efficient service and *spare parts* organization with air-freight deliveries, see to it that Canadair-built aircraft get back into the air F-A-S-T: saving customers thousands of hours often lost on the ground. "For *spare parts*, you can count on Canadair—anytime—anywhere!"

CANADAIR

LIMITED, MONTREAL, CANADA

• Aircraft • Research and Development
• Guided Missiles • Nuclear Engineering

A SUBSIDIARY OF GENERAL DYNAMICS CORPORATION

CA57-8USTR

AIRTRENDS

Air Force should be able to keep a reasonably modern, superior fighting machine even with a tight $7-billion-a-year limit on expenditures for new end items. This is the view of Lt. Gen. Clarence S. Irvine, Deputy Chief of Staff-Materiel (see page 23). But to stay within the $7 billion, USAF will crack down on procurement, be more selective in choosing weapon systems. And not only prime contractors will feel the pinch. Says Irvine: "Neither do we intend for Air Force funds to be paid to small business, unless we get our full dollar's worth of hardware . . . We don't intend to subsidize the marginal, high-cost, late-delivery people."

Look for USAF and the Navy to launch big campaigns to counter effects of "overselling" the missile. Both did such a good job that high priority for missiles is seriously jeopardizing fund availability for advanced manned systems.

Air Force predicts that 35% to 40% of its force will still be manned in 15 years and the Navy estimates 60% in 10 years. Both now claim there's no end in sight to requirements for manned systems, although missions and design types will change.

Future functions of manned aircraft will be primarily reconnaissance, defense, target selection. Also, even with development of later ballistic missiles with terminal guidance capability, pinpoint attack will still require manned guidance. Both services are anxious to get into serious development of missile fighters, maximum altitude high-speed interceptors and long-endurance systems. But it's going to take some persuasive arguments to sway the missile-minded Congress.

The Army is waging a stepped-up campaign to "sell" its complete Jupiter IRBM to the Defense Department, cutting out USAF's Thor entirely as the nation's 1,500-mile intermediate missile. Army fired its missile twice last month—both times successful—while the airmen encountered another control failure in the Thor.

Despite official restrictions on news releases, Army has leaked considerable information on the success of its IRBM, including word that it can be put into production quickly. Army men also emphasize that any attempt to merge Thor and Jupiter into a single weapon would delay availability of a midrange missile by 12 to 18 months. They want the three-man IRBM committee, headed by missile czar William Holaday, to decide the Thor-Jupiter matter on an "all or nothing" basis, figuring this will dictate selection of their weapon.

Future combat aircraft powerplant will probably have to be a dual-cycle system to achieved maximum desired altitudes and speeds. Navy is sponsoring preliminary design work on a rocket-ramjet combination for a manned missile concept.

Biggest stumbling block is neither design nor powerplant, but fear of easy detection. Tremendous heat generated in the airframe at high altitudes would make the plane a sitting duck as an infra-red target. Some highly classified material and decoy projects are under way to lick the problem.

Big question mark in industry at presstime concerns role to be played by National Missile Industry Conference, new association formed by group of top missile makers. According to *Missiles and Rockets* magazine, NMIC has been organized for purpose of putting U.S. missile effort on a more rational basis. What is not clear is relationship of new conference to Aircraft Industries Assn., now representing a healthy share of airframe companies holding prime missile contracts.

DIGEST

Russia's firing of intercontinental missile arouses storm of controversy and misinformation

The U.S.-Soviet race for an intercontinental ballistic missile has leaped into the headlines more prominently than ever as a result of a carefully-worded Russian communique claiming the successful firing of a multi-stage ballistic missile over an intercontinental distance.

The Soviet report touched off a flood of ominous warnings from Administration critics, soothing words from Administration supporters, and a remarkable amount of misinformation in the press. But the fact remained that the Russians had achieved a noteworthy step in their ICBM program.

High U.S. government officials privately confirmed that the Russians had launched a missile over a trajectory several thousand miles long some time early this summer. But they were fairly certain that the vehicle was experimental in nature (like the Army's 3,600-mile Jupiter C fired last fall), and that it indicated only that the Soviets were keeping pace with U.S. efforts.

Sen. Stuart Symington (D-Mo.) and Sen. Henry M. Jackson (D-Wash.) blamed budgetary restrictions for the lag in the ICBM program, but this was hotly denied by Rep. John Taber (R-N.Y.), Sen. Leverett Saltonstall (R-Mass.) and other administration supporters on the hill.

At his press conference last week, President Eisenhower made it clear he was not impressed with the Soviet claim. Noting that many other Soviet statements have been "less than completely reliable," he described the latest communique as "most evasive" and "more notable for what it didn't say than for what it did say."

The President saw little immediate military significance in the Red achievement, noting that manned aircraft will remain for a long time the dominant means of weapons delivery. Moreover, he added, "there is a long distance between proving that you can fire one test instrument in a particular direction and achieve one result and acquiring that instrument in sufficient numbers and sufficient reliability to be worthwhile tactically."

A spate of copyrighted news stories and columns followed the Soviet announcement. One press report held that the Russians had fired no less than six super-long-range missiles during the past several weeks, but this was poohpoohed by reliable Defense sources.

"They fired one very long-range missile, and maybe two, but nothing like the number mentioned in the newspaper reports," according to one key official.

It appeared likely that some of the confusion stemmed from the fact that the Russians fired their multi-stage vehicle over the same range used to test the more modest 800-mile to 1,200-mile Soviet IRBM. Firings of the latter vehicle may have been mistaken for the long-range missile.

Another press report held that the U.S. Air Force had actually launched a "two- or three-stage Atlas" in June, some two months before the Soviet ICBM announcement. This story said the USAF missile traveled 2,400 miles before falling into the ocean and that it attained an altitude of 600 miles and a top speed of 15,000 mph.

Just for the record

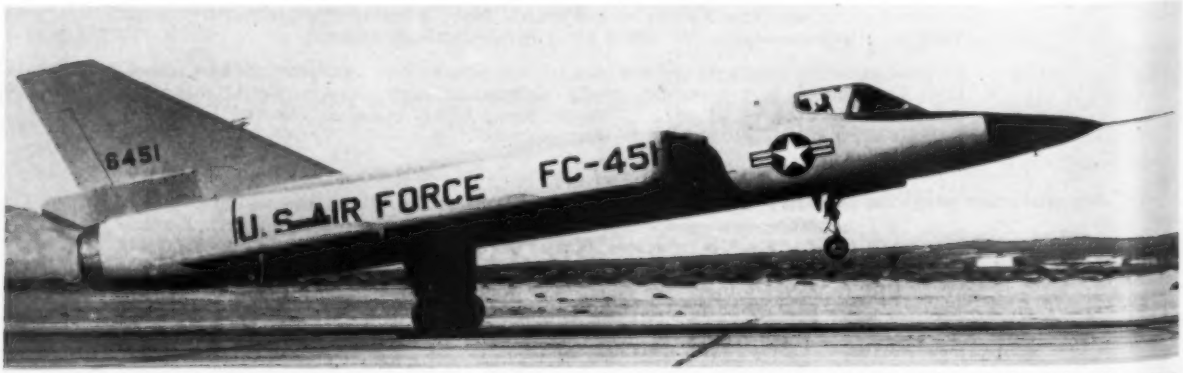
Only one Atlas test vehicle has been launched to date. The firing occurred at Patrick AFB, Fla., in June, and it consisted of the booster section of the Convair missile. The vehicle reached an altitude of about 6,000 feet when a valve failure occurred, shutting off the propellant to one of the two engines. The missile went out of control and was destroyed from the ground.

The Atlas, unlike the Martin Titan, is not a multi-stage weapon. It is powered by three North American rocket engines which are ignited simultaneously. The outer pair of engines are jettisoned when their propellant is exhausted, leaving the center engine as the sole source of power to drive the missile up to its required velocity. This arrangement has led some experts to call it a "one and one-half stage missile."

At the same time that interest picked up in the ICBM race, the firing tempo for intermediate-range ballistic missiles appeared to quicken at the Patrick test range. As August drew to a close, there were reports that both the USAF Thor and the Army Jupiter were launched. The latter reportedly negotiated the full limit of its 1,500-mile design range, while the Thor reportedly encountered control difficulties and was destroyed a few minutes after launching.

As the record now stands, the Army has fired at least three Jupiters over the 1,500-mile design range, while the Air Force has not yet achieved a clear-cut success with its Thor. While failures are the rule rather than the exception in missile development, the difficult problems encountered with the Thor may have important bearing on the decision of the Holaday committee, appointed by Defense Secretary Charles Wilson to amalgamate the Thor and Jupiter into a single IRBM.

First photo of Convair F-106A Delta Dart interceptor



CLIPPED VERTICAL FIN and intakes at wing root above leading edge are identifying characteristics of the delta-wing supersonic aircraft. Powered by P&W J75 with afterburner, F-106A is said to be fastest AF all-weather interceptor yet flown.

Air Force must be 'coldly realistic' in procurement, Gen. Irvine tells West Coast manufacturers

Air Force must be "practical, objective and coldly realistic" in its choice of procurement cutbacks and will retain only those developmental programs "which show distinct promise for operational advantage."

With these words in a speech before the Los Angeles Chamber of Commerce, Lt. Gen. Clarence S. Irvine, deputy chief of staff—materiel, outlined the more selective spending program undertaken by the Air Force in the light of budget limitations.

Irvine acknowledged that the Air Force has found it necessary to stretch out and even cancel programs, but he emphasized "the new trend toward expenditure control is, in itself, no cause for panic in the aircraft industry."

"I assure you," he said, "that we do not like to terminate or reduce our programs . . . When world circumstances, our own national policies, or a scientific breakthrough require us to reappraise our priorities, we will make just such a reappraisal—and alter our course accordingly."

Irvine's talk was part of a day-long program sponsored by the Los Angeles Chamber and attended by more than 1,000 aircraft manufacturers, subcontractors, vendors and suppliers. The event included a luncheon address by Air Force Secretary James H. Douglas and a workshop presided over by Col. Robert V. Kirkland, chief of the Los Angeles Air Procurement District.

Predicts tighter control

Irvine said he believes an annual Air Force hardware expenditure of $7 billion would be sufficient to maintain a modern and superior Air Force, but he warned that this will mean a tighter control in the future.

In stating that the recent cutbacks were not aimed at California companies, Irvine said, "the primary purpose of the Air Force is to defend the United States and its citizens. Our mission is not to spread business around on a geographical basis. It is not to support any segment of our industrial complex or any portion of our national population."

Under the rigid review of the new expenditure program, the general said, "small improvements or low priority projects will have to fall by the wayside."

Companies, in order to remain truly competitive will have to slash overhead, get rid of excess space, eliminate overtime and other premium costs and constantly strive for better management and closer cost control, according to the general.

In a question-and-answer program following his talk, Irvine pointed out that:

Air Force policy definitely will be to use only one source for production. "This," he said, "extends to subcontracting."

Air Force has no intention of keeping government-owned facilities in operation at expense of private industry.

In comparing expenditure control against advance commitments, Irvine said, "We are going to run the Air Force like a business. For the company that does what it says it will do, it will be no problem."

As though to assure companies that have not branched out into the missile field that all is not lost a secondary theme of the conference centered on the continued need for manned aircraft development.

"We have been spending a lot of time studying a follow-on supersonic bomber," said Secretary Douglas in referring to the WS-110A competition between Boeing and North American. He pointed out that the Air Force has several long-range delivery systems on the boards and that the development of any one must be considered in its relationship to all others.

"This explains the Navaho cancellation," he said.

The secretary said he could not say when a WS-110A decision might be made, but added that the development of a long-range supersonic manned bomber is a "high priority matter."

Douglas said manned bombers will be the most accurate method of delivery for some time, especially with advanced air-to-surface guided missiles. The last was an apparent reference to the recent award of a contract for an ASM for the B-52 to North American Aviation.

Marines' air strength to be cut to 1,100 planes; modernization slowed, development activities restricted

Marine aviation will suffer a reduction in aircraft inventory, a slowdown in its combat modernization program and restriction of its specialized development program because of the money-tight fiscal 1958 Navy program (see page 31).

Generally, AMERICAN AVIATION was told, the Marine Corps has started a gradual reduction of its 1,424 aircraft operating program. It now appears that this will be brought to a level of about 1,100 planes in the near future. Later, if future budgets are similar to this year's, the reduction will be in the area of 80-90 planes per year for the next five years.

The three Marine aircraft wings are now undergoing an adjustment. The present 27 tactical squadrons will be maintained. However, the wings will have to absorb some support and administrative organizations, which in actuality will leave two pure aircraft wings, but reduced in size.

High priority Marine development programs will be money-starved in the new year with funds for catapult development already denied because of relatively low priority in the total Navy program. Investigations will continue but the program is "not progressing at the desired rate."

VTOL concept for all aircraft as soon as possible rates high with the leathernecks. Specific development of a combat VTOL aircraft could start this year as far as the state of the art is concerned, a Marine official declared. "However, the people who have to face up to the facts of life, specifically the stringent budget limitations, indicate that there is no possibility to launch a full-scale VTOL program this year."

Three other top Marine programs will continue reportedly, but at a greatly slowed-down rate: JATO installations for fixed-wing tactical planes; "genuine" all-weather close air support capability; and continued STOL development.

Officials privately admit that lower priority programs, such as the one-man helicopter and cargo unloader, will never reach operational status in peacetime, although research investigations will continue.

Here's how the specific aircraft programs now stack up:

Chance Vought F8U-1 stretchout will delay the Marine deliveries by about one year, although there is no change in the numbers to be received.

Lockheed C-130 aerial tanker prototype evaluation will end this month. Enthusiasm is high and officials apparently will fight hard for about 60 of the turboprops to be included in the fiscal 1959 shopping list, though no fiscal 1958 procurement is possible.

Douglas F4D deliveries are "considerably" behind schedule, but technical difficulties rather than budget are the cause. Final deliveries are not now expected until the end of fiscal 1958.

Douglas A4D deliveries are "substantially" on schedule with "amazingly" few difficulties encountered for a new program.

Grumman Vox twin turboprop observation aircraft (new designation OF-1) will make its first flight in mid-fiscal-1959 with first operational planes delivered to Fleet Marine Forces in fiscal 1961 as replacement for the Cessna OE-2.

Sikorsky HUS helicopter deliveries will be completed by the end of November, 1959. Total procurement is for 211 HUS's with a total of 53 accepted as of August 1.

Sikorsky HR2s slippage because of some late deliveries are being corrected and no further slippages because of budget are expected. While some developmental problems had caused delays, majority are now resolved although resulting modification is yet to be completed.

BRIEFS

Manufacturing-military

Douglas A3D-2s are replacing North American AJ-2s in the Pacific fleet. Nine carriers will carry the twin-jets within a year.

Boeing-Wichita has awarded North American Aviation a subcontract for tooling for wing leading-edge assemblies for the B-52. Work will be at NAA's Los Angeles Division.

Dr. Paul Darwin Foote has been nominated to be Assistant Defense Secretary for Research & Engineering, succeeding Frank Newbury, who resigned last spring. Dr. Foote was senior physicist for National Bureau of Standards and retired as vice president of Gulf Oil Co. in 1954.

Collins Radio Co. of Canada has received a contract for $8.3 mililon for UHF airborne communications equipment for the Royal Canadian Air Force.

Sperry Gyroscope has received a $3,984,471 contract for its APN-59 navigation and storm detection radar for Air Force troop and cargo carrier aircraft.

Laboratory for Electronics, Inc. has received a $4.5 million letter contract from the Air Force for its APN-105 Doppler navigation system.

Aerodex, Inc. has received a contract for $1.1 million from Air Force for overhaul of R-2800 CB engines for C-118 and T-29 aircraft.

General Electric Co. has received an $8.9-million order from Convair for jet-engine thrust reversers for the GE-CJ-805 engines for the Convair 880 jet airliner.

Value of aircraft propellers and parts shipped during the first half of 1957 by plants manufacturing complete propellers totaled $70.9 million. This is an increase of 23% over same period last year.

Edgar N. Smith, head of CAA's supplementary Washington airport project, has been appointed chief of the new planning division to be set up in CAA's Office of Airports. Karl Voelter, deputy security officer, has been named to new position as General Aviation Advisor in the Office of Flight Operations and Airworthiness.

General Electric Co. has received its first Navy contract for a missile handling system with award of about $5 million for development of Talos handling and launching system.

Century Engineers, Inc. Burbank, Calif., has acquired Royal Jet, Inc., Alhambra, Calif., through an exchange of stock. Combined worth is $1.7 million.

The 45th Wilbur Wright Memorial lecture will be read to the Royal Aeronautical Society, London, Sept. 13, by Dr. Clark B. Millikan of the Guggenheim Aeronautical Laboratory. Subject is "Advanced Education and Academic Research in Aeronautics."

Lt. Col. Frank E. Everest will receive the 1957 Harmon International Trophy for Outstanding Aviator and Malcolm D. Ross and Lt. Comdr. Morton L. Lewis will receive the Outstanding Aeronaut (lighter than air) award.

Financial

Piasecki Aircraft Corp. reports a loss of $508,437 for the fiscal year ended June 30. Company had sales of $1,200,357. Backlog is more than $1 million.

Braniff Airways reports a seven-months net income of $945,200, equal to 32¢ a share compared with $1,051,900, 36¢ a share for the same period a year ago. A 15¢ dividend will be paid September 12 to shareholders of September 6.

Piedmont Airlines showed a net income of $98,674 before taxes for the second quarter of 1957. Year ago loss was $2,133 during same period.

Greer Hydraulics, Inc. reports half-year profits of $51,000 on sales of $2,873,490. This was first time since 1954 that first-half showed profits.

McDonnell Aircraft Corp. stockholders have voted to increase authorized common stock by 300,000 shares to 2 million shares. Increase will provide for future stock dividends.

Lockheed Aircraft Corp. reports sales to $525,067,000 and earnings of $7,570,000, equivalent to $2.56 a share for the first six months of the year. Year ago at same time figures were $335,774,000 sales, $7,534,000 earnings, $2.58 a share.

California Eastern Aviation, Inc. reports net earnings of $19,904 after taxes for the second quarter. Last year net was $242,450.

Aeronca Manufacturing Corp. reports earnings of $338,057 on sales totaling $10,754,515 during the first half of the year. Same period year ago figures were $304,378 on $10,129,267.

Thomas Wolfe & Associates is a new firm organized in Los Angeles to serve aviation industry in such matters as mergers, refinancing and program adjustments.

Airborne Instruments Laboratory, Inc., reports sales of $5,622,000 for the first half of 1957 compared with $4,917,000 a year ago. Profits after taxes were $190,498, or 96¢ a share, compared with $154,000 or 78¢ a share last year.

Emery Air Freight Corp. grossed $5,311,789 in revenues for the first six months. Earnings were $359,336, 52¢ a share.

Transport

Willis Player, former vp-public relations for ATA, has been elected vice president of American Airlines.

Trans World Airlines has cancelled its two daily transcontinental all-cargo flights and will phase out Kansas City-Los Angeles C-54 cargo service.

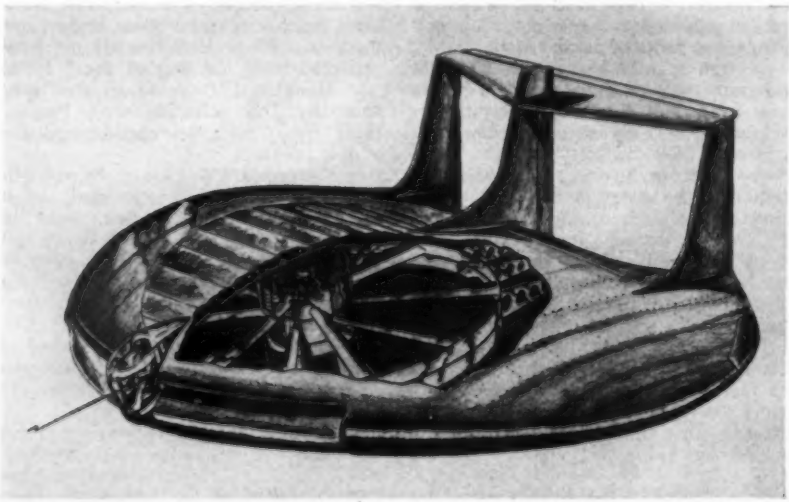
Cargon Transport, Inc., which holds the U.S. license for the Cargon System of freight transportation, has elected Robert W. Johnson president and treasurer; Ford Studebaker, vice president, and John Marshall, secretary.

Transocean Air Lines has received a Navy contract for more than $2.5 million for transport of domestic cargo.

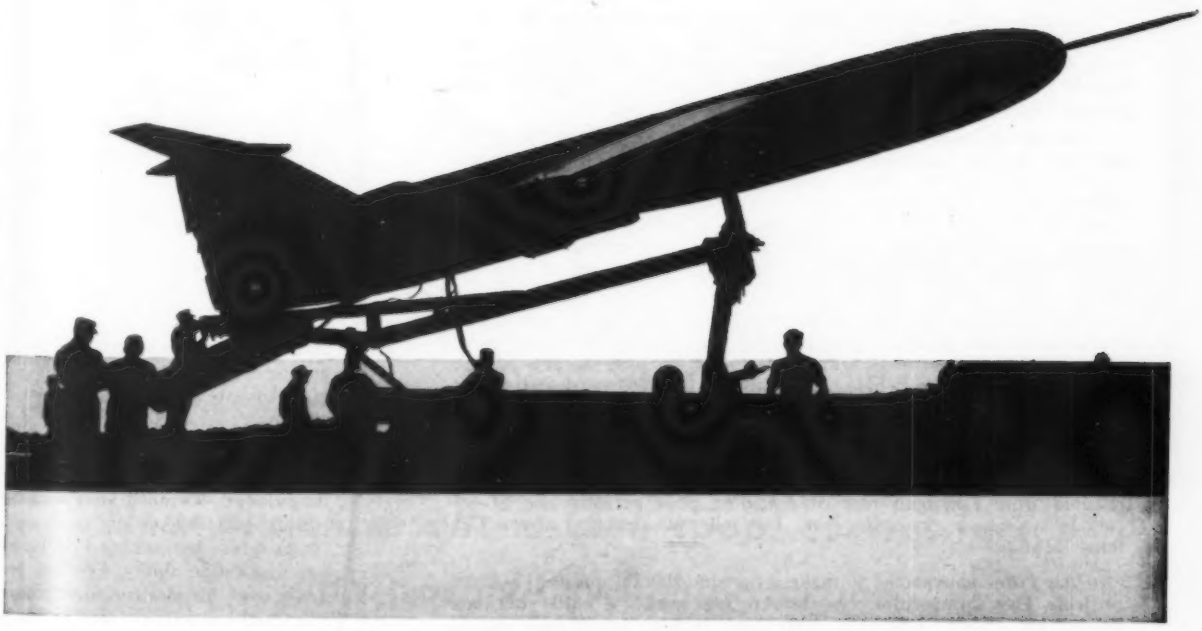
The Flying Tiger Line has announced it will begin the first through-plane all-cargo service between the Pacific Northwest and the east and middle west with Super H Constellations about October 1.

Nelson B. David, former president and general manager of Alaska Airlines, was sworn in last week as U.S. representative on the ICAO council.

Goodyear's Convoplane—newest VTOL project



ARTIST'S CONCEPT of Convoplane as it was proposed by Goodyear Aircraft Corp. before company received recent study contract from Office of Naval Research. Convoplane conceived by Dr. R. S. Rose, Goodyear asst. mgr.-R&D, uses two contrarotating fans to move air through top and bottom louvers of saucer-like VTOL.



"PAPA" The Martin Matador TM61-B is the fourth generation of a famous family. As the lineal descendant of the first operational tactical missile in service with the Air Force—and the first pilotless bomber having complete interchangeability of parts—the performance, operability and advanced engineering of the Matador give it top rating in our missile arsenal. Today, this important weapon is one of five major Martin projects in the field of rockets and guided missiles that are under development or in production for the Army, Navy and the Air Force. It was the original Martin Matador, papa of them all, that launched the new age of missiles in America.

MARTIN

BALTIMORE · DENVER ORLANDO

SPOTLIGHT

Air Force is in the process of redesignating the Martin Matador from TM-61 to TM-76. The present Matador B, with Atran guidance, would become TM-76A; the TM-61C, with Shanicle guidance, would become TM-76B.

Navy is considering conversion of its 36 Convair R4Y-1 transports to turboprop power, using Allison T56 engines—if it can find the money. The R4Y-1 is Navy version of the Convair 340. North American Aviation's Columbus Division is bidding for the job.

Lockheed's commercial version of the C-130B Hercules is only the first stage in a program to develop the original design. There is plenty of stretch in the aircraft, which will be exploited in the '60s.

Curtiss-Wright says the thrust reverser developed for its TJ38 turbojet engine provides 62% reversal and can be developed to 80% or more. Company has disclosed plans for two higher thrust models of the engine—14,500 lbs. and 16,200 lbs., compared with present 12,500 lbs.

Vertol Aircraft plans to test-fly the General Electric T58-equipped H-21D this month and the Lycoming T53-powered model 105 by early October. Both turbine powerplants can be installed in existing H-21s with minor modifications and are said to increase ton-mile efficiency nearly 100%. Army is sponsoring the H-21D project, Vertol the 105. Both aircraft have two engines geared to single rotor shafts. Turboshaft engines will be offered on an optional basis.

Lateral-scanning radar is the application for GE's new transparent two-color phosphor screen radar tube. Radar is for air mapping and has been mentioned as means of insuring success of the proposed "Open Skies" plan. Color might be used to detect object heights relative to ground. Each half of picture is taken by one radar, joined on tube for photographing.

Last minute cancellation of a Boeing paper on electronics problems in strategic bombers scheduled for the Wescon show reportedly resulted from Pentagon fear of revealing poor performance of so-called "systems engineered" gear. The talk was canceled at top Defense Dept. levels.

Air Force is expected to make a decision this fall on its WS-110A project. This competition has turned into quite a battle between Boeing and North American, with latter making surprisingly strong bid in light of Boeing's record of big bomber experience. But USAF has to decide to go through with the program before either company can win, and the huge cost has made it difficult for Air Force to make up its mind.

Hawker Aircraft's private-venture Mach 2-plus fighter, the Hurricane, has been designed the P.1121. Airframe is financed by Hawker Siddeley Group, the afterburner-equipped Gyron engine by de Havilland. Hurricane is officially described as a "strike" aircraft, indicating low-level naval application.

Curtiss-Wright's Plastic Div. has developed a new material called "Curon," which reportedly has extraordinary sound absorption characteristics. In one experiment, a 15x20-foot curtain of "Curon" hung behind a jet engine during runup picked up so much of the noise engine was barely heard 1,000 feet away. One airport is studying use of material to cover walls, ceilings etc.

Deliveries of MDAP-furnished Hawker Seahawk fighters to the Royal Netherlands Navy have started. British aircraft will be based aboard the carrier Karel Doorman.

Nuclear-powered aircraft will require about eight years lead-time to compete with the next generation of chemically-fueled types, BuAer estimates. R. Zirkind, BuAer researcher, predicts first version will be a moderate-performance (Mach 0.5) turboprop with great endurance.

To the ENGINEER of high ability

The most important engineering assignments are now being placed with companies which can point to superior accomplishments not only in research and development, but in production of the end items. Because of this, engineers interested in aircraft and missile components and systems will find outstanding opportunities at the Garrett Corporation. Our prime areas of operation include the following:

air-conditioning

pressurization

heat transfer and cryogenics

pneumatic valves and controls

system electronics, computers and flight instruments

gas turbine engines and turbine motors

The Garrett Corporation also has made important advances in prime engine development and in design of turbochargers and other industrial products.

Our engineers work on the very frontiers of present day scientific knowledge. We need your creative talents and offer you the opportunity to progress by making full use of your scientific ability. Positions are now open for mechanical engineers ... mathematicians ... specialists in engineering mechanics ... electrical engineers ... electronics engineers.

For further information regarding opportunities in the Los Angeles, Phoenix and New York areas, write today, including a resume of your education and experience. Address Mr. G. D. Bradley

THE GARRETT CORPORATION

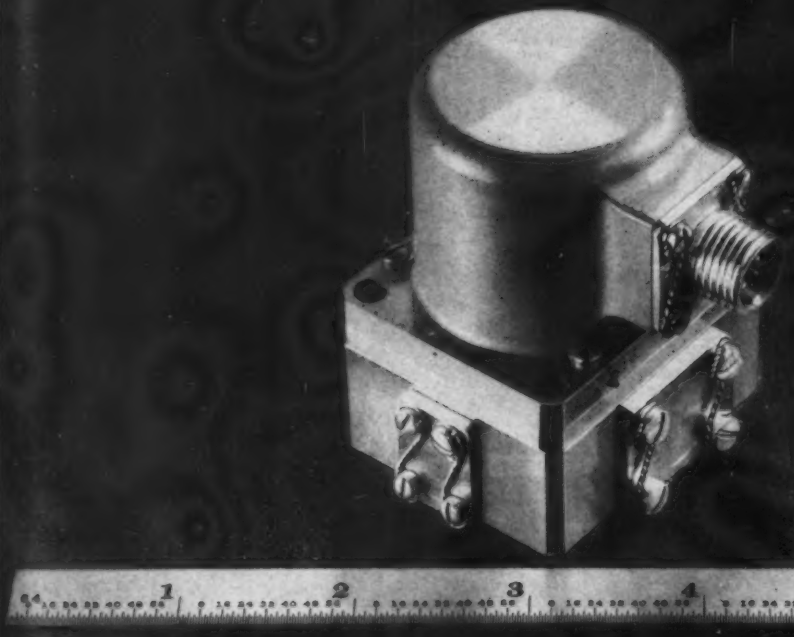
9851 S. Sepulveda Blvd.
Los Angeles 45, Calif.

DIVISIONS:
AiResearch Manufacturing Los Angeles
AiResearch Manufacturing Phoenix
AiResearch Industrial
Rex—Aero Engineering
Airsupply—Air Cruisers
AiResearch Aviation Service

Circle No. 10 on Reader Service Card.

For control system applications...

the AiResearch time dwell electro-hydraulic servo valve



SPECIFICATIONS:

Weight	1.25 lb.
Electrical input	10 milli-amperes
Operating pressure	200 to 4000 psi
Rated flow	0.12 to 5 gpm
Fluid	OS45-1 (or) MIL-O-5606
Oil Temperature	−90°F to 400°F

New design results in high spool control forces with positive switching action

The AiResearch Time Dwell Servo Valve is a two stage switching type electro-hydraulic valve. It converts low level electronic signals into hydraulic energy which actuates mechanisms to steer or control missiles, aircraft, and ground control and similar equipment.

Weighing only 1¼ pounds, this AiResearch valve has the following characteristics:

Spool velocity rather than position is the control parameter.

Spool centering springs are not required.

Performance is maintained even with contaminated oil.

It is unaffected by accelerations to 50G in any direction.

It is insensitive to varying spool friction loads.

It has a wide temperature range of efficient operation.

In combination with a matched actuator, the Time Dwell Servo Valve gives true $1/s^2$ dynamic performance. This allows the servo systems engineer to achieve system response, resolution and stability previously unattainable.

• *Outstanding opportunities for qualified engineers*

THE GARRETT CORPORATION

AiResearch Manufacturing Divisions

Los Angeles 45, California • Phoenix, Arizona

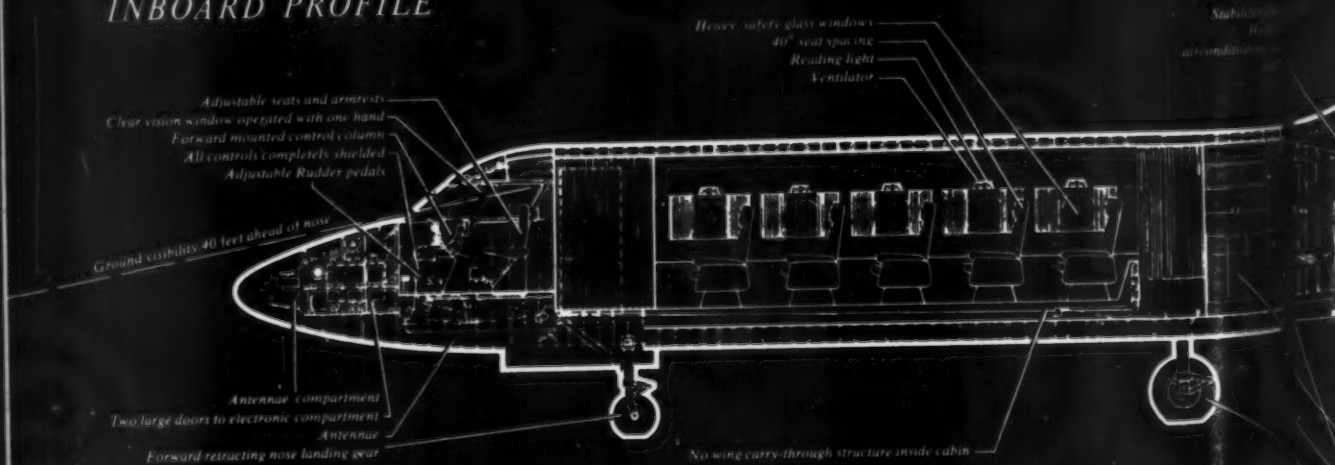
Designers and manufacturers of aircraft systems and components: REFRIGERATION SYSTEMS • PNEUMATIC VALVES AND CONTROLS • TEMPERATURE CONTROLS CABIN AIR COMPRESSORS • TURBINE MOTORS • GAS TURBINE ENGINES • CABIN PRESSURE CONTROLS • HEAT TRANSFER EQUIPMENT • ELECTRO-MECHANICAL EQUIPMENT • ELECTRONIC COMPUTERS AND CONTROLS

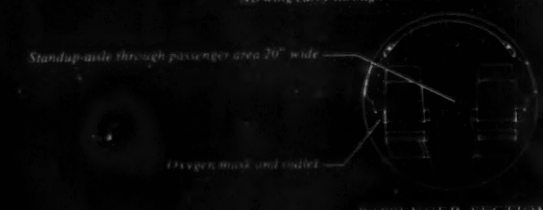
JETSTAR

THE LOCKHEED UTILITY JET TRANSPORT

ENTRY SECTION

INBOARD PROFILE

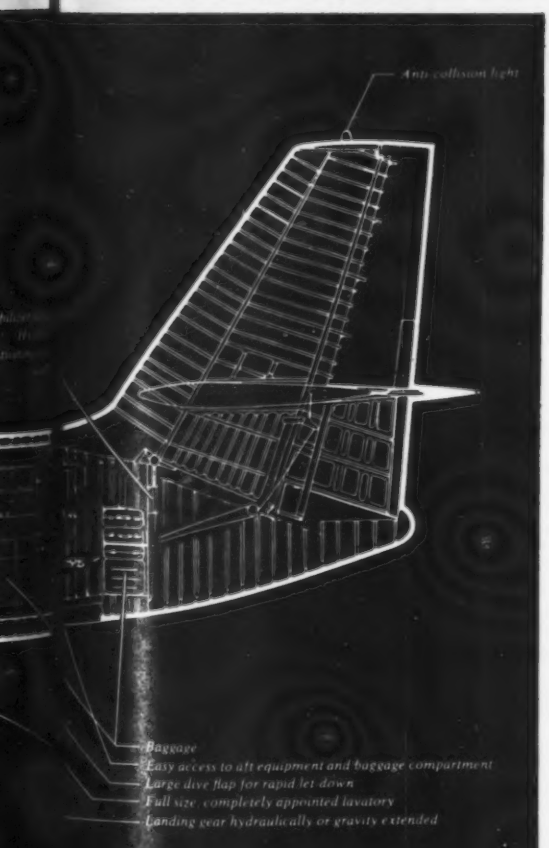




PASSENGER SECTION

ANNOUNCING THE NEW LOCKHEED JETSTAR

a 10-passenger utility jet transport with 4 engines, designed to perform a variety of Jet Age military missions at low cost.


Anti-collision light
Baggage
Easy access to aft equipment and baggage compartment
Large dive flap for rapid let-down
Full size, completely appointed lavatory
Landing gear hydraulically or gravity extended

Able to match the performance of large jet transports, but at a fraction of their costs, the new swept-wing Lockheed JETSTAR will cruise 500/550 mph at altitudes from 25,000 to 45,000 feet—for ranges of 2,000 statute miles and more.

Amazingly quiet (due to the aft fuselage mounting of engine jet pods) the JETSTAR is ideal for transition pilot training, heavy bomber crew training, and testing ground navigational aids. High-speed navigation training and gunnery practice, in-flight refueling indoctrination, and high-priority cargo carrying are additional vital uses for which the JETSTAR was designed.

The JETSTAR carries a full complement of radio and navigation gear and is fully pressurized and air conditioned.

Like all Lockheed aircraft, the JETSTAR embodies simplicity of structure and functional systems—for high strength and reliability. Easy to maintain, economical to operate, the JETSTAR carries on the 25-year tradition of Lockheed's leadership in the design and manufacture of high-speed aircraft for the military, commerce and industry.

LOCKHEED *means leadership*

Lockheed Aircraft Corporation
Georgia Division
Marietta, Georgia

B. F. Goodrich rides the JETSTREAM* —gives added safety on 6300 mile hops

TRANS WORLD AIRLINES' new Jetstreams (Lockheed 1649-A) are now providing speed and comfort for passengers flying over four continents. And every time a Jetstream takes to the air, it relies on a wide variety of B.F.Goodrich aviation products.

B.F.Goodrich Pneumatic De-Icers with chordwise inflation tubes snap ice from wings. The same quick-snap principle is used for de-icing the tail and for the nose radome De-Icer which keeps the "electronic eye" operating in all kinds of weather.

B.F.Goodrich Tubeless Tires for main and nose wheels reduce weight, make possible greater Jetstream payloads. Tubeless Tires also have superior air retention qualities. They save time and money in warehousing and maintenance, too.

B.F.Goodrich Pressure Sealing Zipper baggage panels are airtight, yet zip open easily for servicing. They resist abrasion and impact of hundreds of pounds of luggage. Pressure Sealing Zippers are also used as flexible disconnects in the duct system which carries conditioned air to the passenger compartment.

B.F.Goodrich heated rubber supplies spot heat for localized areas such as air intakes, oil lines and oil valves, keeps engines and equipment functioning smoothly.

B.F.Goodrich oil cells contain electrically heated rubber blankets that keep oil at proper temperatures, free-flowing at high altitudes or in cold weather.

B.F.Goodrich water cells supply plenty of water for drinking and washing on even the longest trip. They meet the strictest requirements of health officials.

For help in designing equipment to make planes fly farther, more safely, contact B.F.Goodrich Aviation Products.

**Jetstream is a service mark owned by TWA exclusively.*

B.F.Goodrich Aviation Products

a division of The B. F. Goodrich Company, Akron, Ohio

Tires • Wheels • Brakes • Heated Rubber De-Icers • Inflatable seals • Fuel cells Pressure Sealing Zippers • Rivnuts • Avirim Adhesives • Hose and rubber accessories

Circle No. 12 on Reader Service Card.

SEPTEMBER 9, 1957—VOL. 21, NO. 8

AMERICAN AVIATION

WORLD'S LARGEST AVIATION PUBLISHERS

Navy's 1958 plans . . .

Still shopping for 1,025 aircraft despite stretchouts and cutbacks; missile procurement uncertain

by Lois C. Philmus

NAVY HAS PARED, whittled, stretched, curtailed and lopped its aircraft and missile schedules to come up with what it hopes is a firm fiscal 1958 program within the Defense spending ceiling.

Some stretchouts and reductions were ordered in four aircraft programs. New shopping list was trimmed down to 1,025 aircraft from the original request of 1,220 and provides for procurement of 12 different models. Several new developments are under rigid scrutiny before final authorization to establish their priority in the overall development and requirements scheme.

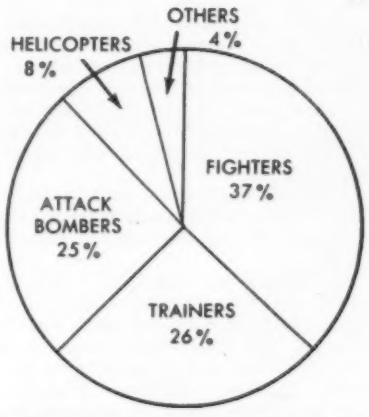
Navy's missile procurement program is fairly stable, but along with its sister services, its development projects are up for grabs in the Defense Department's overall missile review, scheduled for Fall resolution.

Philosophy behind Navy reduction methods is an effort to keep all its aircraft and missile programs active. Cuts, therefore, were horizontal—trimming a little off the top of each. However, the Navy has gone as far as it can with this method and any further cuts will be "vertical"—whole programs will have to be sacrificed.

Here's how things have shaped up:

Seven companies can expect new orders out of the fiscal 1958 aircraft procurement program. They are Douglas (A3D and A4D attack bombers); North American (A3J attack and T2J jet trainer); McDonnell (F3H, the only fighter on the list); Sikorsky (HSS, HUS and HR2S helicopters); Grumman (WF anti-submarine warfare plane and F9F-8T transition trainer) and Lockheed (T2V trainer).

Curtailment has included a "token" cutback of the Chance Vought F8U-1 estimated at under 20 aircraft; a production stretchout of the Douglas F4D; curtailment and stretchout of the Douglas A4D-2, and a minimum stretchout of the McDonnell F3H-2.



BIGGEST slice of Navy's aircraft procurement will be apportioned for fighters.

Regulus I, according to present plans, will phase out around December, 1958. A small production order for its successor, Regulus II, is in the new year program. The Triton long-range ramjet missile program is at a virtual standstill, though not cancelled outright. Only work on its guidance aspects is continuing.

Navy program for the F11F was unchanged. Although not in the fiscal 1958 schedule, previous orders will proceed as originally scheduled. More orders for the Grumman F9F-8T will be placed than originally anticipated because of a priority requirement for a supersonic transition trainer for carrier operations.

Immediate follow-on aircraft plans are set in some areas. Work on development of the Grumman W2F (now under Phase I contract) will continue to provide a successor to the WF anti-submarine plane. Sikorsky HSS-2 turboprop helicopter will be ready for production in about a year, as a follow-on to the HSS. Its General Electric T58 turboshaft engine is just about ready to go.

Keen interest in the USAF supersonic trainer development, the Northrop T-38, is evidenced by the Navy. It definitely will procure quantities of the aircraft when ready, as follow-on to the F9F-8T. It also plans to purchase the same combat readiness and jet utilities aircraft as the Air Force, under a joint off-the-shelf program.

A little less definite are some of the high priority combat development programs.

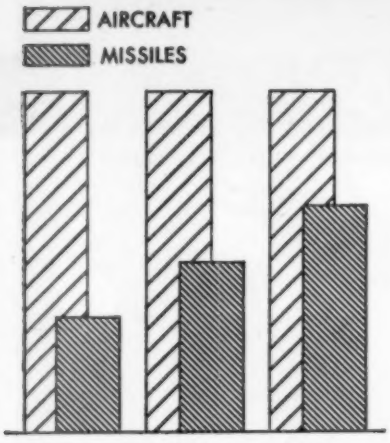
Convair contract for development of the unique tri-engine anti-submarine will be delayed. Design details are being "re-ironed" out and the requirement thoroughly re-evaluated. Objective, obviously, is to prune costs to a minimum before obligating funds. When finally awarded, development contract will be through prototype.

Entries in the low-attack plane competition are now under intensive study, but it will be several months before a decision is reached. Despite its already high priority, spending ceiling demands another review for absolute certainty.

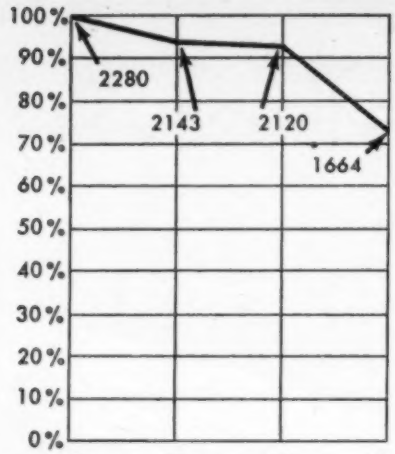
Strongly underlying new year planning is advanced planning as more and more missiles reach the operational stage. Caught in the web of "overselling" the missile, both the Air Force and Navy are now trying to bring it back into perspective.

"The guided missile is not a panacea," RADM W. A. Schoech, BuAer deputy director, told AMERICAN AVIATION, "but in some areas can do a better job than manned systems. It is going to take good judgment to decide which system can do the best job for the least amount of money"

Polishing off his crystal ball, the former BuAer development chief predicted that the procurement ratio of



RATIO OF manned aircraft to missiles will go from 3:1 in 1958; 2:1 in 1963; to 1.5:1 by 1968 in the Navy inventory.



MANNED AIRCRAFT deliveries will begin a downward decline this year from 1956 going to 73% of the total in 1959.

manned aircraft to missiles would be 1.5-1 in 1968, rising from 3-1 this year and 2-1 in fiscal 1963. As the ratio reaches the balance point, manned aircraft deliveries will begin their decline.

Working from calendar 1956 figures of about 2,280 deliveries, a 6% decline to 2,143 is expected in 1957 deliveries; 7% in 1958 for 2,120 with a big dive in 1959 of 27% for an estimated total of 1,664.

Increase in missile production coupled with slowdowns and cutbacks obviously will cause an over-facilitization problem, similar to that facing the Air Force. Navy investment in contractor- and government-owned facilities currently stands at $833,837,405. More than half the money ($556,104,169) is in machine tools and equipment with $271,312,150 in buildings and land improvements and $6,421,086 in land.

Four-pronged program

While the Navy does not plan to shut down any of its own plants in the "immediate future," Admiral Schoech outlined a four-pronged program for disposing of unneeded facilities when the time arrives:

1. Encourage the contractor to increase subcontracting even if it means some personnel cutbacks at his own plant. "While it may hurt the prime contractor somewhat, it will spread the work more equitably and make maximum use of existing facilities," the Navy official explained.

2. Advertise availability of surplus capacity throughout other Federal agencies before abandoning the surplus facility.

3. Encourage contractors to utilize extra space for producing non-conflicting commercial work.

4. Failing any of the three steps above, outright disposal.

Queried on the future of the gas turbine in the new scheme, Admiral Schoech stated: "Overall we don't think there will be a material reduction in production numbers in the future, but the type of engines developed and produced most likely will change. Ballistic- and rocket-powered weapons tend to decrease development and production of heavy jet engines. However, increased uses are growing in the field of trainers, transports, anti-submarine warfare aircraft of the smaller, lighter engine types."

But BuAer's chief concern is reducing costs to keep within the ceiling and still preserve the heart of its program.

"We are very carefully looking at our contracting procedures in light of the tough fiscal environment," Admiral Schoech said. The BuAer evaluation is apart from the outside study being conducted by Booz, Allen and Hamilton. The consultants' study on airframe contracting procedures will be completed in December.

However, the BuAer spokesman denied it heralded a major overhaul of Navy contracting procures. "We don't think we need it, but it is good to have an outside look."

A concerted campaign to reduce overhead charges by contractors is well under way. Navy has already put into effect overtime restrictions in its current programming within the 2% of total man-hours allowed by the Defense Department order.

Further, BuAer has written to every major airframe and engine contractor, noting individual overhead record for past years. Areas which appear to be too high are specifically cited. Each contractor was asked to advise on how it expects to reduce excessive costs and estimate what dollar amount can be reached. There have already been a number of feedbacks, the Admiral added.

"We are going after this area and expect significant improvement," he declared.

Aggressive action in these areas is mandatory. Continuing rising costs forced the cancellation of the A4D-2 and revision of the F5D, W2V and SeaMaster programs. Navy can't afford any more. More costly, complex weapons have demanded more fixes in the supersonic age and greater cost. The ceiling has pushed the services into some soul-searching in this area. With no new funds available for fixes, the only answer is to reduce the production program to get the money for the fixes.

Funds earmarked

Continuous and specific scrutiny will be given to each and every program throughout the new fiscal year. Right now BuAer is waiting for the Defense Department apportionment of its funds from its $1.837 billion appropriation for aircraft and related procurement.

"Ball park" figures call for 37% of the dollars to be earmarked for fighters—F3H procurement and continued development of the F8U-3 and F4H.

Next highest is 26% for trainers, followed by 25% for attack bombers, 8% for helicopters and 4% for other miscellaneous categories. This will not be firmed up until the apportionment is firm, however.

As it stands now, Defense will not make apportionments for the whole year but probably for six-month periods. But it is not expected to delay BuAer from placing immediate orders.

It will, however, force another searing review should spending exceed the six-month ceiling of $19 billion imposed on all services.

Talos on launcher

Navy's long-range surface-to-air Talos will be handled by a complex loading and launching system weighing more than 350 tons. System will store, load, train, elevate and launch the 20-ft., 3,000-lb. ramjet missiles.

1,000-hour 'round-the-clock tests improve H-37A

Army 'crash program' increases life of critical components of new twin-engine Sikorsky helicopter

By Henry T. Simmons

THE ARMY has completed an accelerated 1,000-hour testing program on the Sikorsky H-37A helicopter which was designed to pack three years of operational experience into six months.

The intensive operational testing was conducted by the U.S. Army Transportation Aircraft Test and Support Activity, under the command of Lt. Col. Charles E. Hollis at Fort Rucker, Ala. It was the first such test of its kind undertaken by the Army.

Major improvements in the overhaul life of critical H-37A components were achieved during the testing cycle, according to Col. Hollis. The life of the twin-engine machine's main gear box was boosted from 100 to 300 hours, tail rotor blades were increased from 150 to 700 hours and the main rotor assembly was boosted from 150 to 300 hours, he said.

In order to achieve the accelerated flight program, TATSA was organized to operate around the clock on a 24-hour, 7-day-week basis. An objective of 50 hours' flying time a week was established at the outset, which meant that the aircraft would have to fly from dawn to dusk on its simulated one- to three-hour missions and that maintenance would take place during the hours of darkness.

A constant flow of components and spare parts from the manufacturer to the user was essential to carry out the test objective, Hollis said. Small items were shipped by air freight, while large items were trucked directly to Fort Rucker.

In this way, rebuilt assemblies and components could be returned to TATSA and installed in the test machine at the earliest possible opportunity and thus accumulate sufficient flight hours on which to base a recommendation for increase or decrease in service life.

The primary objective of the program was to obtain a maximum of 700 hours on each major time-change component so that a sufficient number of overhauls were performed upon which to base recommendations," TATSA said. "From flight experience it was found necessary that certain components had to be modified for suitably extended use."

One of the principal advantages of accelerated testing is that it permits the incorporation of equipment changes in aircraft during the production process itself and not by means of expensive retrofit kits which must be installed in the field, at depots and occasionally by the manufacturer himself. This permits "great savings," TATSA said.

One of the most important dividends of the accelerated test program was a new maintenance concept, Hollis said. He described this as a revised technique for periodic inspection which involved "progressive" inspection of related groups of components during the routine nightly maintenance job affecting the entire aircraft.

"Instead of pulling the whole aircraft apart when the time came for periodic inspection," Hollis said, "we did a little bit of the periodic each night and thus spread the load over a period of several days." He added that this "realistic inspection" technique may be of major importance to commercial helicopter operators.

"Our flight availability went up nearly double what it was at the start," he explained. "For the same number of man-hours expended, we doubled our flight availability. This means you could hold your flight availability at a given number of man-hours and reduce your requirement of maintenance man-hours."

Hollis reported that two flight failures occurred during the testing cycle. These consisted of an oil-pump shaft failure and a failure of a transmission component, both of which broke down early in the 1,000-hour test program.

The TATSA commander also emphasized the importance of the H-37A accelerated test program from the standpoint of increasing the life of components. "Normally," he said, "it takes three to five years to increase component life. We got it in six months, and it is important to do it early in the game."

The H-37A is powered by two Pratt & Whitney R2800-54 piston engines with a normal rated horsepower of 1,900 each. Normal gross weight is 29,000 pounds, but the five-bladed rotor system can manage up to 31,000 pounds in an overload condition.

Although the H-37A is just entering service, the Army is already making plans for its successor. Barring last-minute changes in budget plans, the soldiers will order a competition for a gas turbine-powered helicopter of three tons' payload capacity toward the end of this fiscal year.

SIKORSKY H-37A twin-engine helicopter can haul payloads of three tons over normal cruise range. Here it is shown with a three-ton Honest John (minus fins).

Commercial C-130 can carry 45,000 pounds 1,750 miles

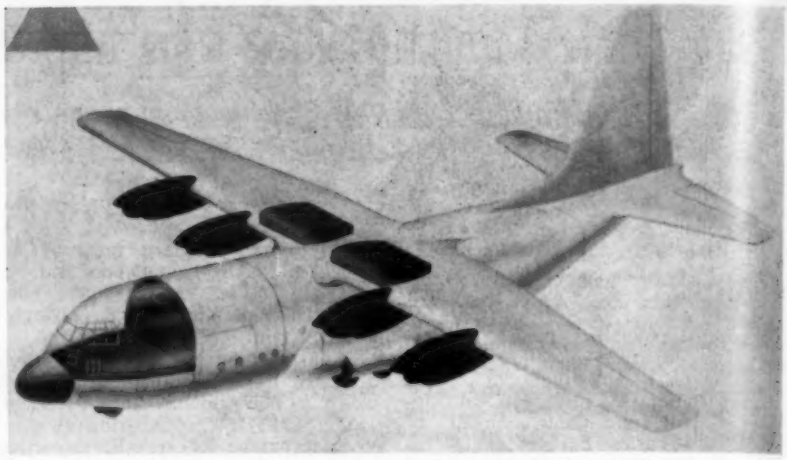
Lockheed Aircraft Corp. is now offering a commercial version of the C-130. Basically similar to the "B" version of the C-130 (shown), the commercial Hercules will offer a maximum payload of 45,000 lbs. for a nonstop distance of 1,750 statute miles, with normal fuel reserve.

Payloads of more than 16 tons can be carried more than 3,000 statute miles nonstop, with normal fuel reserves. Normal cruising speed of the Hercules will be in the 350-mph bracket at altitudes to 30,000 ft. A 1960 delivery date is being offered.

Although Lockheed is still working out final economic details for the commercial C-130, indications are that it will be priced at about $2 million and will have an operating cost of below 6¢ per ton-mile.

The exact performance data for the commercial Hercules will not be known until the certification status of the aircraft is clarified and this may affect economic data. However, few changes are anticipated.

Lockheed submitted an application for type certification of the C-130 to the CAA Sept. 13, 1956. Since then a great deal of work has been done in establishing with CAA the ground rules that will apply to the certification program.



DARK AREAS indicate where changes will be made in the C-130B.

Several meetings have been held with CAA to discuss the design features of the aircraft and CAA has participated extensively in witnessing static tests, structural fatigue tests and fail-safe tests of the C-130A. These tests will provide a good background for the certification proceedings for the commercial Hercules.

The CAA has also witnessed fire-extinguishing tests and participated in the mockup review of the Allison turboprop engine (model 501-D22) to be installed in the commercial Hercules.

A Lockheed spokesman told AMERICAN AVIATION that "a good deal of progress has been achieved and the foundations have been established for a smooth and rapid CAA certification when the proper time arrives."

Robert F. Stoessel has been advanced to the newly-created position of Hercules commercial sales manager. He was formerly manager of sales engineering in Lockheed's Georgia Division. He was succeeded in this post by William R. Plage, group engineer.

Earlier, Lockheed revealed that the "B" version of the C-130 turboprop transport provides greater range and payload over the "A" model.

The new model will have more powerful engines, additional fuel tanks, four-bladed props. It was developed to meet an Air Force request for greater range and load-carrying ability.

Powerplants will be four Allison T56A-7s, same as engines being used by Lockheed on commercial Electras. The change from three- to four-bladed Aeroproducts props and increase in engine-propeller gear ratio provides greater prop-fuselage clearance and a reduced prop-tip speed. Propeller diameter has been reduced from 15 ft. to 13.5 ft.

New crew compartment arrangements allow the Hercules to carry multiple crews. Features include hot-meal galley, refrigerator and reclining rest quarters.

Beefed-up landing gear permits higher takeoff and landing weights. Takeoff weight has been increased to 135,000 lbs., compared to the C-130A figure of 124,000 lbs. Additional fuel tanks carry an extra 1,820 gallons.

A Complete Service for Government Procurement

ACQUISITION • ADMINISTRATION • NEGOTIATION

DEFENSE PROCUREMENT REPRESENTATIVES incorporated

174 Fifth Avenue, New York 10, N. Y. • ALgonquin 5-9341

Circle No. 21 on Reader Service Card.

HAVE YOU TRIED...

FLIGHTEX GLASS CLOTH

FLIGHTEX FABRIC

WORLD'S PREMIER AIRPLANE FABRIC

FLIGHTEX FABRICS, INC.

93 Worth Street • New York 13, N. Y.

Leading Manufacturers of Fabrics and Tapes for the Aircraft Industry

Circle No. 22 on Reader Service Card

North American to develop WS-131B missile

North American Aviation has announced that it will have system responsibility to develop the WS-131B air-to-surface missile. Autonetics Division will develop guidance and allied components while NAA's missile division will work on the airframe.

Powerplant reportedly will be the General Electric J85 or Fairchild J83.

The missile is assigned a high Air Force priority and will be designed for long-range bombardment aircraft, particularly the B-52G.

The contract will not affect planned reduction of 12,000 employes at NAA but will probably forestall further layoffs, according to the company.

SeaMaster to have aerial tanker capabilities

The Martin P6M SeaMaster will be provided with aerial tanker capabilities. The Martin Co. has awarded a contract to Flight Refueling, Inc., to design and produce a prototype probe and drogue system to be installed on one of the early SeaMasters.

Rotary mine door on the jet seaplane will also accommodate refueling system equipment. The P6M will be able to transfer or receive about 10,000 gallons of fuel with the system. Tanker flight tests will be conducted at the plant and at Patuxent Naval Air Test Center, Md.

Air Force to scrap 200 B-36s for salvage

Air Force has approved the scrapping of 200 B-36 bombers. Ninety-five of the giant bombers have already been scrapped and sold as salvage.

A total of 383 of the bombers were built at a cost of about $3.5 million each.

The aircraft being scrapped are stripped of engines, parts, radio, radar and flight instruments to support remaining B-36s and for other uses.

Air Force investment in Navaho $690 million

Air Force investment in the North American Navaho project has been placed at $690 million. Major portion of the funds went to the three NAA Divisions which developed the airframe, liquid rocket booster engines and guidance systems.

The cancelled project has resulted in advanced developments of rocket engine power and guidance systems which are applicable to the ballistic missile progrem.

ARDC to move in January

Air Research and Development Command will move from Baltimore to Andrews Air Force Base beginning January 1 and will complete the move by January 31.

world's first man-made satellite uses controls produced by

bernco!

bernco

Controls
Test Equipment
Wiring Harnesses
Thermocouples

It happens once in a lifetime . . . an opportunity to work on the rocket for launching the earth's first man-made satellite into outer space. It happened to BERNCO. Our "feet-on-the-ground" creative craftsmen welcomed this challenge.

Specifications for controls on the satellite rocket were carefully screened, quality standards were rigid and production was 100% inspected, as with all BERNCO controls.

The finished controls are *reliable* and at *reasonable* cost because of BERNCO's quality control system and production techniques.

It will be a while before the earth satellite is eventually orbited in space. In the meantime, BERNCO would like to be of service to you.

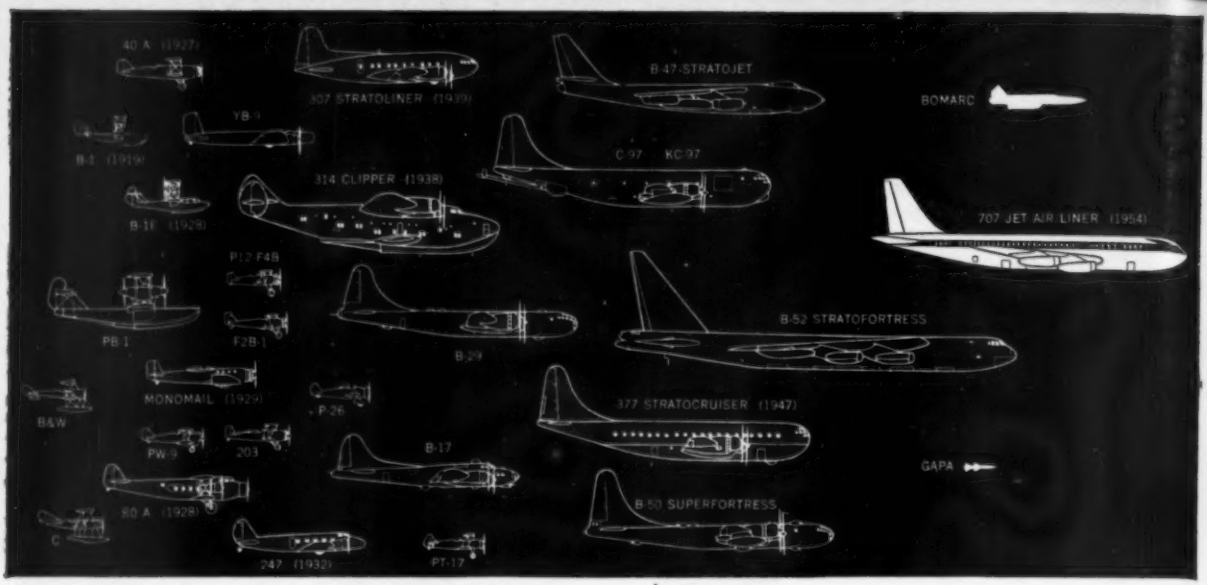
BERNCO offers a *complete* service in the design, production and environmental-testing of electrical, electronic or electro-mechanical component parts—*completely customer designed, partially* BERNCO *designed* or *completely* BERNCO *designed*.

Try BERNCO, where rocket and missile electrical components are a specialty.

JUST OFF THE PRESS! A new illustrated brochure will help acquaint you with Bernco's service and facilities. Write for your copy, now!

BERNCO ENGINEERING CORPORATION • 2320 SOUTH TIBBS AVENUE • INDIANAPOLIS 41, INDIANA

Circle No. 28 on Reader Service Card.



From Boeing have come the pioneering passenger planes . . . the mighty fortresses . . . the flying boats . . . all part of the family tree of America's first jet airliner, the incomparable Boeing 707.

Aboard the Boeing 707 you'll enter the age of jet travel in a plane flight-tested three years . . . cruise across continents and seas . . . in luxurious comfort and quiet . . . at 600 miles an hour.

These airlines already have ordered Boeing 707s: AIR FRANCE • AIR INDIA • AMERICAN • B.O.A.C. BRANIFF • CONTINENTAL • CUBANA • LUFTHANSA • PAN AMERICAN • QANTAS • SABENA • TWA

BOEING 707

House probers ask Justice Dept. to investigate ATA

By Charles Schaeffer

HOUSE ANTITRUST INVESTIGATORS have urged the Justice Department to make a sweeping probe of the Air Transport Association for possible violation of antitrust laws.

Recommendation came in a long-delayed report on the airline industry by the House Antitrust Subcommittee. Probers also asked CAB:

To veto its 17-year-long approval of ATA's articles of association which they said virtually immunize the carriers' representatives from antitrust laws.

Launch a general investigation of Pan American World Airways, augmenting recent limited studies.

The 358-page study follows by more than a year lengthy hearings on the airline industry in the spring of 1956. The House unit is headed by Rep. Emanuel Celler (D-N.Y.), whose Democratic colleagues are Peter W. Rodino, Jr. (N.J.), Byron G. Rogers (Colo.) and Lester Holtzman (N.Y.).

On sections of the comprehensive report involving ATA and Pan American, Republicans Kenneth Keating (N.Y.), William M. McCulloch (Ohio), and William E. Miller (N.Y.) dissented.

Investigators expressed concern over ATA's practices this way: "After consideration of its record, the committee is of the view that a substantial number of ATA's activities for its member carriers involve serious antitrust problems."

The ATA critics questioned the appearance of ATA officials at certain CAB meetings. "The committee recommends that in the future the Civil Aeronautics Board scrutinize carefully any application of ATA to intervene independently and in addition to its members carriers in the Board's quasi-judicial proceedings."

Elsewhere, the subcommittee:

Urged CAB to speed up a dragging general passenger fare investigation.

Called upon the Board to make a study of the comparability of airmail to airfreight service in line with Comptroller General recommendations.

Underscored the Comptroller General's recommendation that the Board promulgate rules requiring a carrier to make automatic refunds when first-class fares are charged for coach service.

Proposed a new examination by CAB of its endorsement of the International Air Transport Association's rate conference system. Probers noted: "Our national antitrust policy demands that the interests of the traveling public of the U.S. and of the world no longer should continue to be subjected to the force of 'an all-embracing international cartel'."

Asked CAB to retract its approval of all provisions of travel agency resolutions of ATA and IATA which conflict with the subcommittee's views.

Urged the Board to consider strongly new and additional competitors for the "Big Four" airlines.

Rapped CAB for its handling of the non-scheduled airline industry but endorsed the Board's enforcement moves against non-sked law violators.

Of ATA, majority members de-

what . . .

7 minute delivery of etched, anodized metal nameplates? Sounds impossible BUT . . .

with Miller Dial's revolutionary new Fotofoil Kit, short run problems for nameplates, dials, panels, schematics and templates, are *solved* in just 7 minutes . . . and it's all done *in your own plant!* Fotofoil Kit requires no darkroom, skilled technicians or photographic equipment. This self-contained kit includes all necessary chemicals, equipment and Fotofoil to produce top quality product identification . . . *in just a few easy steps!* Fotofoil is supplied in all standard anodized colors and thicknesses from .003. Designed for "crash" programs, research and development departments, prototype models.

Territories open for Industrial Suppliers.

MILLER DIAL & NAME PLATE CO.

4400 N. TEMPLE CITY BLVD., EL MONTE, CALIF.

Offices in principal cities.

Circle No. 17 on Reader Service Card.

IMP* KAAR OFFERS AIRPORT EQUIPMENT EFFICIENCY

*Industrial Mobile Phone

Because each low cost IMP boosts vehicle efficiency tremendously . . . and *immediately* . . . your investment in this Kaar radiotelephone system is returned in weeks. No other industrial equipment pays for itself so quickly!

Designed for triple duty as base transmitter, mobile radiotelephone, and public address system, the IMP keeps vehicles in contact with each other as well as central dispatching . . . stops empty trips and needless backtracking . . . turns every trip into a payload haul!

Complete Unit **$360**

Ruggedly built for industrial use, the IMP measures only 12½" x 8¼" x 5¼". Installation is simple, tune-up not required, and maintenance costs low.

Call your Kaar dealer for a demonstration.

ENGINEERING CORP.

2916 Middlefield Road, Palo Alto, California

Canadian Office: 801 Dominion Bldg., Vancouver, B. C.

Circle No. 16 on Reader Service Card.

cleared: "Some of (its) activities flow from agreements so apparently anti-ethical to national antitrust policies that the committee does not believe they were the kind of agreements that Congress intended to be submitted to the Board, or if submitted, that the Board would or could approve.

"Further, even where antitrust immunity may have been available had the particular agreement been submitted for approval under section 412, many of the joint activities and agreements undertaken by ATA and the certified industry . . . of competitive significance have not been so submitted and accordingly remain subject to the antitrust laws.

"For these reasons the committee recommends that the Antitrust Division of the Department of Justice undertake at an early date a comprehensive investigation into the relationship of ATA to its certificated members to ascertain whether the trade association has been a vehicle for joint activities that have involved violations of the antitrust laws . . ."

From such a study, the report asserted, the Justice Department should be able to hand Congress recommendations for laws "to assure effective procedures for the grant of antitrust immunity under section 412 and for the maintenance of competitive conditions in the airlines industry."

Majority members urged the Board to yank its approval of ATA's articles of association and thereby end an "ambiguous" situation. "Withdrawal of the Board's approval would remove this ambiguity in that activities that have antitrust immunity could readily be determined by examination of the Board's orders . . ."

The Republican trio, however, protested, charging that the recommendation was "totally unnecessary and without sound foundation." They added: "It is not believed that withdrawal of the Board's approval of the articles of association would accomplish any of the objectives of the committee that could not otherwise be accomplished by enforcement of the antitrust laws and the Civil Aeronautics Act."

The operations of Pan American Airways fell under the scrutiny of the investigators. Majority members said they believed that "the power possessed by PAA in its dominance of overseas and international air transport of the U.S., together with the exercise of that power in its operations, present important issues with respect to both the enforcement of the antitrust laws and the administration of the Civil Aeronautics Act.

"The committee commends CAB for recent limited investigations . . . These investigations are salutary. The committee believes that in addition to these limited inquiries, the Board should undertake at an early date a general investigation into all of Pan American's activities in order to determine whether or not its dominant position in the U.S. flag foreign and overseas air transportation, and its trade practices, accord with the antitrust policies and public service objectives of the Civil Aeronautics Act."

Probers also alerted CAB to weigh other antitrust problems and to take a look at the operations of other U.S. flag carriers.

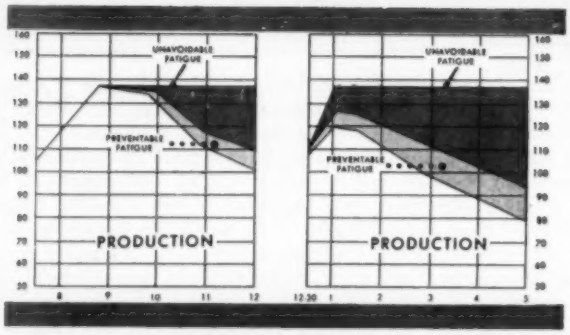
In their minority dissent, the Republicans said the government has already initiated action "to the extent that a need has been demonstrated . . ."

"Further," they continued, "the Board undertook an extensive audit of Pan American interests in its affiliates when sufficient personnel became available to the Board for that purpose. . ."

The minority lawmakers asserted that the Board has instituted a comprehensive investigation into Pan Am's relationships with its affiliates, in which it will consider any restrictions or conditions that should be placed on its approval of existing agreements.

"We are not aware, on the basis of the facts available to us, of any areas affecting Pan American where appropriate corrective action has not been taken," they said. Consequently, they concluded, "a general investigation of Pan American by the CAB is without merit."

12% MORE PRODUCTION



WORKER FATIGUE REDUCED

WITH Royal® INDUSTRIAL SEATING

Your workers are more alert, more productive when comfortably seated. Tests prove it! *Royal* industrial seating reduces fatigue, gives you higher production all day, (see charts above).

For 40 years, in hundreds of plants, *Royal* seating has helped to boost output, cut rejects, trim costs.

Tired Workers Cost More . . . Than Royal Chairs

POSTURE IS PERSONAL

Royal industrial chairs let the worker sit the way *he* wants. Backs adjust 4 ways for individual comfort fit. *Royal* chairs adjust quickly, lock firmly. For any job, under any working conditions, there's a *Royal* chair that's just right.

Scroll seat, shaped back rest adjustable 4 ways, convenient foot rail and 8" height adjustment in this sturdy Royal 515-S make it standard equipment in thousands of plants.

ROYAL METAL MANUFACTURING CO.
175 N. Michigan Avenue, Chicago 1, Ill., Dept. 41-J
(In Canada: Royal Metal Manufacturing Co. Limited, Galt, Ont.)
Please send Catalog 7001 on Royal Industrial Seating.
Individual .....
Company .....
Street .....
City, Zone, State .....

Circle No. 14 on Reader Service Card.

How long can you rely on any aircraft battery?

SILVIUM RESISTS CORROSION

Silvium alloy grid after corrosion test.

Non-Silvium alloy grid after same test.

Here's the honest answer:
You can rely on your battery only as long as it still has its rated capacity and its grid is still intact. And only the Exide Aircraft Battery has these three built-in safeguards to insure long reliability:

1. **Silvium* grids.** So resistant to long flight overcharge damage, they usually outlast the battery.
2. **GOX active material.** Ultra-fine particles pack more power per ounce . . . insure high output to meet heaviest loads.
3. **New Pormax separators.** 25% more porous to electrolyte. Improve battery's ability to handle constant heavy loads.

Remember, you can't *see* a grid corroding. And when it fails, it gives no warning . . . might easily cause an embarrassing takeoff delay. Be safe. Install Exide batteries.

They cost no more than batteries that don't give you their protection. Call your nearby Exide office. Or write Exide Industrial Division, The Electric Storage Battery Company, Phila. 2, Pa.

U. S. Patent

Exide®

Circle No. 13 on Reader Service Card.

ENGINEERS...

MAC presently has stimulating engineering positions available in a great variety of fields including:

•

Internal Aerodynamics
Design Engineering
Structures Engineering
Electronic Component Engineering
Aerodynamics
Structural Dynamics
Electronic Packaging Engineering
Operations Engineering
Electronic Circuit Analysis
Digital Systems Engineering
Dynamics
Airloads and Flight Criteria
Aircraft Fire Control Systems
Aeroelasticity and Flutter
Thermodynamics
Wind Tunnel Test Engineering
Flight Test Engineering
Reliability Engineering
Telemetry Systems Engineering
Flutter and Vibration
Ground Support Equip. Engineering
Liaison Engineering

•

For more information about our company and community, write in confidence to:

R. F. Kaletta
Technical Placement Supervisor
P. O. Box 516
St. Louis 3, Missouri

McDONNELL
Aircraft Corporation

Bill Piper gets keys to 45,000th plane at fly-in

More than 650 lightplanes were flown to Lock Haven (Pa.) Airport Aug. 17 to honor William T. Piper for his 28 years in aviation and to salute the 45,000th plane off the Piper Aircraft Corp.'s production line, a new world record for civilian aircraft production.

At the height of the fly-in as many as 10 aircraft were counted on the final approach, with up to 30 in the pattern through most of the morning. Because of the density of traffic individual landing instructions were impossible, the pilots being required to space themselves in the pattern to permit an orderly flow onto the Lock Haven runway.

Although the 45,000th airplane, a Piper Apache, attracted attention, most interest was directed to the prototype Comanche parked on the ramp.

The Comanche is a single-engine, low-wing four-placer, scheduled to go into full production this month. Design cruise speed is 160 mph with the Lycoming 180-hp engine. Tentative selling price is $13,500. A later model will be equipped with a 250-hp engine.

The more than 50 Apaches and 200 tri-pacers that were flown in, added to the single and twin Beech aircraft, Cessnas and Aero Commanders, made up an impressive array of business and corporation aircraft.

William T. Piper, Sr., flanked by his three sons, William T., Jr., Tony and Howard (all vice presidents of the company), met with representatives of the press, aviation oldtimers, private pilots, families and local enthusiasts.

In a brief talk after receiving the keys to the 45,000th airplane, which he will use as his personal plane, Piper said, "I never expected to have a day like this."

45,000TH PIPER aircraft to roll off production line at Lock Haven, Pa., will be used as personal plane of William T. Piper, Sr., president of company.

Manned balloon sets altitude record

A manned balloon set an altitude record of more than 100,000 ft. during an Air Force project to determine human reactions in space flight.

Maj. David Simons, chief of the space biology branch of the Aero Medical Field Laboratory at Holloman Air Development Center, made the ascension and was up for 32 hours. Previous record was 96,000 ft.

Navy Ordnance chief commends Fairchild

The Guided Missiles Division of Fairchild Engine & Airplane Corp. has been commended by Rear Adm. F. S. Withington, chief of Bureau of Ordnance, for "economies resulting in savings of over $4 million."

Fairchild refunded the money to the government as a result of savings achieved in the Petrel missile program. The company has refunded more than $20 million during the past three years.

Senate approves AF Reserve promotions

The Senate has approved the following Air Force Reserve promotions:

From brigadier general to major general—Theron Baldwin Herndon, Director of Aeronautics, Louisiana; John B. Henebry, president of Skymotive, Inc.; Robert James Smith, president of Pioneer Aeronautical Services and former president of Slick Airways.

From colonel to brigadier general—John R. Alison, vice president—customer relations of Northrop Aircraft, Inc.; Ramsay D. Potts, Jr., special counsel for ATA and the Aeronautical Training Society, and former president of IMATA.

the NEW Electronic Three Phase Control

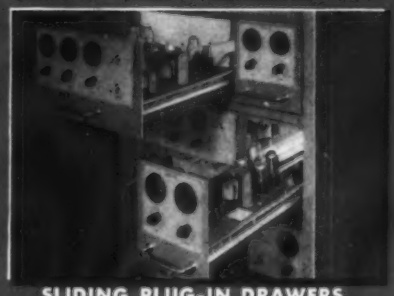
Digitronic*

uses counting tubes for the control of resistance welding

All timing, sequence, and other functions designed and built as individual units.

SLIDING PLUG-IN DRAWERS

Each unit is built on an individual, sliding-drawer chassis, with a cable-mounted, cam-locked plug. And, all plug-in units are directly interchangeable.



SLIDING PLUG-IN DRAWERS

COLD CATHODE TYPE COUNTING TUBES

Used instead of RC networks to control all timing functions. Individual sets of counting tubes, for each timing function, eliminate complicated switching and gating circuits. Preheat, weldheat and postheat can be individually adjusted, for different operations, at different frequencies.

EXCLUSIVE UNITIZED CONSTRUCTION

Hailed because it permits the interchangeability of units. One spare timing unit will serve a multiplicity of functions. Units can be removed or replaced in just a matter of minutes.

EXCLUSIVE "SET-UP/RUN" SWITCH

This exclusive feature allows instant, visual check-out of all timing circuits, before an actual run, and, without the use of any special test instruments—ever!

SEPARATE HEAT CONTROL PANELS

There's one for each of the various heat functions, such as preheat, weld, postheat and current decay. These heat control panels are interchangeable, too!

SEPARATE HEAT CONTROL PANELS

*Trade Mark of Weltronic Co.

Control meets MIL specifications.

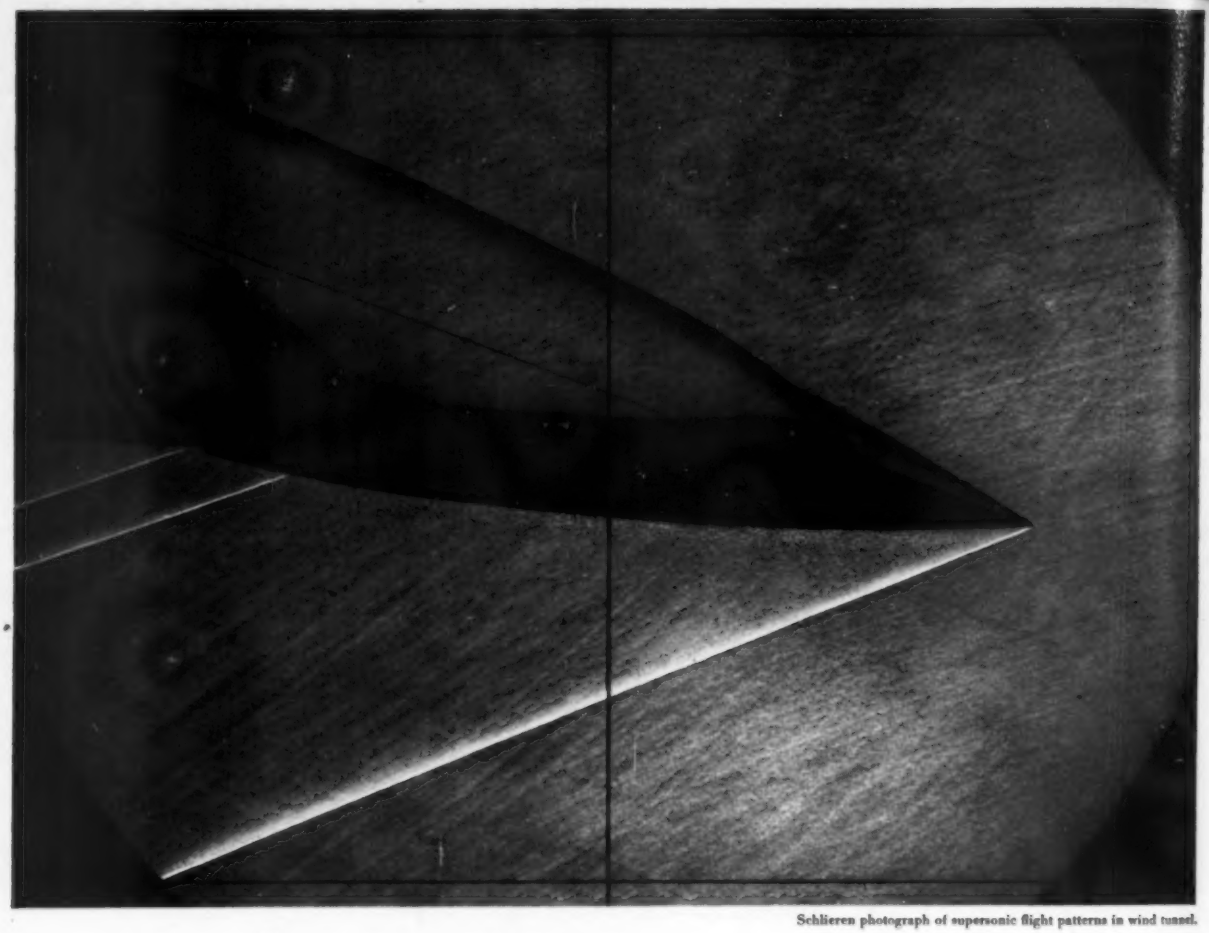
Write for Descriptive Literature.

Weltronic®

WORLD'S LARGEST SUPPLIER OF RESISTANCE WELDING CONTROLS

WELTRONIC COMPANY

19500 West Eight Mile Road • Detroit 19, Michigan



Schlieren photograph of supersonic flight patterns in wind tunnel.

There is a formula for supersonic supremacy

Supersonic supremacy is the absolute condition of America's future security. It is a day-to-day thing. It must grow with major new advances; it must be strengthened by aircraft that fly much faster, much farther and higher.

North American Aviation's vast backlog of experience in the design and production of supersonic aircraft—by far the greatest in the Free World—is concentrated on this unending challenge. There are sound reasons for North American's ability to design superior aircraft with certainty—and to turn them into hardware with speed and economy:

North American designs for performance. The supersonic F-100 Super Sabre exceeded the speed of sound on its first flight in 1953. And there is still no Air Force operational airplane that can match the F-100's tactical and combat versatility, or its endurance—proved by record-breaking non-stops: London to Los Angeles, Los Angeles to New York, and New York to Paris.

North American designs for production. From the beginning, North American's engineers have designed every airplane for rapid, low-cost production. That is why North American can turn a new weapons system concept into a flying reality in the shortest possible time.

North American designs for growing potential. From the basic F-100 design came a brilliant series of new versions—the F-100A, C, D, and F—all adapted to special duties without sacrificing speed, range, altitude, or payload ... or spending the years and millions normally required for new designs.

North American designs for the future. The X-15 rocket plane, now in production, will carry man higher and faster than ever before. The X-10 Test Missiles have completed the supersonic missions that proved out the aerodynamic design and flight-control systems of the Navaho intercontinental guided missile. The Navaho is America's most advanced strategic weapon—and the closest to production.

The formula for supersonic supremacy in the future is supersonic experience today. North American has it.

NORTH AMERICAN AVIATION, INC.

Los Angeles, Fresno, Canoga Park, Downey, California; Columbus, Ohio; Neosho, Missouri.

NORTH AMERICAN HAS BUILT MORE SUPERSONIC AIRCRAFT THAN ALL OTHER COMPANIES COMBINED

Trunklines face crucial financing problems

CAB's refusal to grant major carriers fare increase may mean loss of $50-75 million revenue, discourage investors

by Selig Altschul

FINANCING PLANS of the airline industry were seriously affected by the refusal of the Civil Aeronautics Board to approve an emergency fare increase for seven domestic trunk airlines.

If granted, such an increase could have meant an estimated $50 to $75 million in additional annual gross revenues to the entire domestic trunk air transport industry.

On the surface, for an industry grossing some $1.5 billion annually in total operating revenues, the increase sought through the fare increase would appear to be insignificant and hardly likely to ruffle financing plans. Nothing could be farther from the truth.

Earnings are marginal

Taking the high side of the projected fare increase ($75 million), if granted, would have represented but 5% of the industry's total gross revenues. Yet this small amount has the power to exercise tremendous leverage on earnings and, hence, on the financing abilities of the separate airlines.

Airline earnings have been marginal. In many cases, narrow profit margins have been washed away by rising operating costs and deficits have become more prominent. The emergency fare increase was clearly needed to restore a better balance so that, at best, a minimum level of earnings could be maintained. Such earnings were and are a basic requirement if the industry is to fulfill its obligations in meeting projected capital expenditures.

Earnings obviously, in themselves, can not begin to provide anywhere near the new capital required. However, it is their very existence along with the trend of such profits which make it possible for a company to go into the competitive money pits and obtain equity capital. And it is this equity capital which is a must if short and long-term loans, of all varieties, are to be attracted. These are the hard economic facts of life facing the airlines and why an emergency fare increase was and is so vital.

As first estimated here about two years ago, capital expenditures of at least $3 billion were indicated for the group through 1965. If anything, this now appears to be on the low side.

At the 1956 year-end, the domestic trunks showed an aggregate net worth of $575.5 million and long-term debt of $324.1 million. Total assets were carried at $1.28 billion. This is indeed a small base from which the industry is expected to support upwards of $3 billion in capital expenditures. But this goal is attainable if sufficient earnings are available to prime the capital pumps so that debt capital will be forthcoming.

Where the equity base is inadequate, new stock issues or subordinate convertible debentures are a prerequisite to obtaining money to be represented by senior-type securities. New capital issues could meet up to $1.5 billion of the industry's estimated capital expenditures. The balance would have to be generated from internal sources such as depreciation cash throw-offs, sale of surplus aircraft plus retained earnings. To the extent that any of these sources proves deficient, compensating elements will have to be developed elsewhere. If not, those carriers unable to cover their deficiencies simply will not be able to go forward with their capital expansion programs.

Yet the CAB appeared to have been oblivious to the part earnings play in the sequence of events underlying the industry's projected capital expansion programs. In the absence of the CAB decision detailing the basis of the official edict refusing the emergency fare increase, it can be presumed that the Board found the reasoning as advanced by its own staff more convincing than that put forward by the separate airlines.

As stated by the CAB's Bureau of Air Operations: "The industry has raised substantial funds for its equipment needs." And after summarizing various financing arrangements, the Bureau declares that, "The conclusion is inescapable that the industry has been able to raise long-term funds on favorable terms."

Still need financing

This is a dangerous assertion for the Board to have relied upon in reaching its decision. The fact remains that many of these long agreements are dependent upon earnings and/or new equity bolstering net worth positions to certain ratios before any of the credits can be drawn down. Further, working capital positions must be maintained at specified levels or these loans will be in default. It is not difficult to see where the present trend of operations may make it impossible for a number of carriers to implement the full measure of their credit agreements.

Moreover, it is a fact that not a single airline has arranged for all of the financing necessary to accommodate its complete equipment expansion program. Obviously, unless the required funds are forthcoming, certain planned capital expenditures face cancellation.

Many of the carriers may well re-

Trend of average market/book value ratios for major domestic trunk airlines

	1946	1948	1950	1951	1952	1953	1954	1955	1956	Aug. 23 1957*
American	3.32	3.16	2.52	2.69	2.23	1.63	1.69	1.88	1.57	1.23
Braniff	3.30	1.34	1.22	1.55	1.35	0.87	0.95	1.17	1.01	0.66
Capital	3.71	....	1.71	1.44	1.13	0.79	1.20	1.16	1.86	0.94
Eastern	2.81	1.68	1.26	1.53	1.35	1.14	1.30	1.66	1.68	1.06
National	5.32	1.23	1.57	1.67	1.36	0.96	0.84	1.13	1.03	0.78
Northwest	2.04	0.98	0.80	0.97	0.83	0.61	0.62	0.99	0.73	0.58
TWA	2.99	11.27	1.71	1.71	1.18	0.97	1.09	1.22	0.92	0.57
United	1.86	0.83	0.88	1.35	1.12	0.95	0.98	1.25	1.07	0.67
Western	3.80	0.95	0.97	1.18	1.01	0.75	0.87	1.22	1.07	1.22

Note: * Based on 1956 year-end book-value and August 23, 1957 market quotations.
Source: Standard & Poor's Industry Surveys.

quire equity-type financing and in amounts greater than that first contemplated some years ago. In large part, this is made necessary by the deficiency in earnings which increases the pressures to build up equity positions. It is these declining earnings and the CAB's failure to grant remedial fare action which have created a vicious circle from a financing point of view.

Market/book value ratios low

As shown in the accompanying table, the market price of airline equities are, for the most part, at their lowest levels in years in relation to underlying book values. Equity prices have simply been driven down sharply in market value because of their lack of investment appeal. This compounds the industry's difficulties in marketing new equity issues.

Further, should any new financing be attempted currently (with the exception of American and Western), it will be at the expense of diluting the equities of the existing stockholders. This practice is not likely to draw investment support to the industry.

Aircraft leasing arrangements may come in greater usage in the industry. However, this is usually a more expensive way of financing equipment than if it were done directly by the airline with its own credit. Moreover, it creates a new layer of prior changes which must be considered in any capital structure.

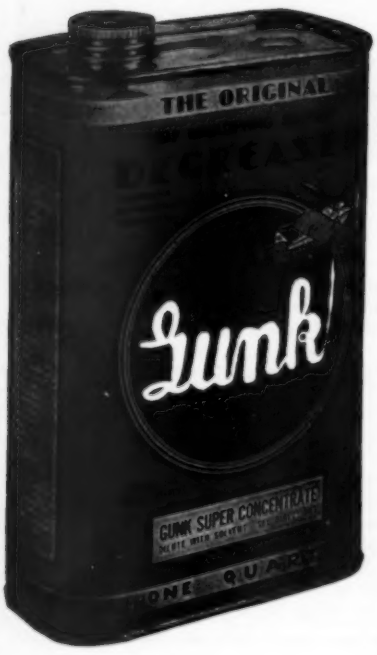
Ironically, it is the Board's own actions in unleashing extensive competitive conditions within the industry that have made the material capital expenditures on the part of the individual airlines necessary.

No one airline is going to be short of equipment and be able to hold on, at the very least, to its present position over established route segments plus attempting to carve out new volume over new extensions.

The competitive pressures are clearly evident in the operating results for this year.

DEGREASER!
Self-Emulsifying Solvent

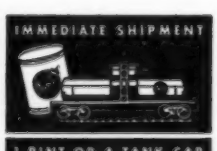
Engine and Fuselage Shampoo
Issue Size Concentrate Makes 2 Gals.



SLUICE OFF!
Takes cling out of oil, grease, carbon smut . . . emulsifies it . . . so that all dirt may be washed off as easily as you rinse hands under water faucet. Launders engine and fuselage nacelle faster, more completely and safer than steam cleaning (warm the engine). Self-scouring action brings out factory-clean appearance . . . provides accurate visual inspection. GUNKed engines run cooler . . . safer. GUNKified oils and dirt flow away in a safe oil-in-water emulsion cleaning bitumastic and concrete aprons . . . eliminating fire hazard. GUNK emulsifies and occludes gasoline spills into water.
Stocked by better wholesale suppliers throughout the world. Sold nationally by VanDusen and Air Associates. Flatly refuse imitations.

PERFORMANCE AND SAFETY SUPERIOR . . . MEETS AND SURPASSES GOV'T. AND MILITARY SPECIFICATIONS
Write for Technical Data Catalog Inserts.

THE CURRAN CORPORATION
(Home Office) South Canal St.
LAWRENCE, MASSACHUSETTS
Plants
GUNK Chicago Company
Chicago 38 (Licensee)



Ryan expects record $60 million in sales

Boeing Airplane Co.'s cancellation of Ryan Aeronautical Co's subcontract to produce aft fuselage sections for the 707 jetliner only "takes a little bit off" total volume, which is still rising, President J. Claude Ryan said in San Diego.

Ryan's business volume will reach a new high in fiscal 1957, its president indicated. Sales are expected to exceed $60 million. This will top the San Diego company's previous record of $56 million, marked up in wartime 1945. The outlook for 1958, profitwise, is even better, Ryan said.

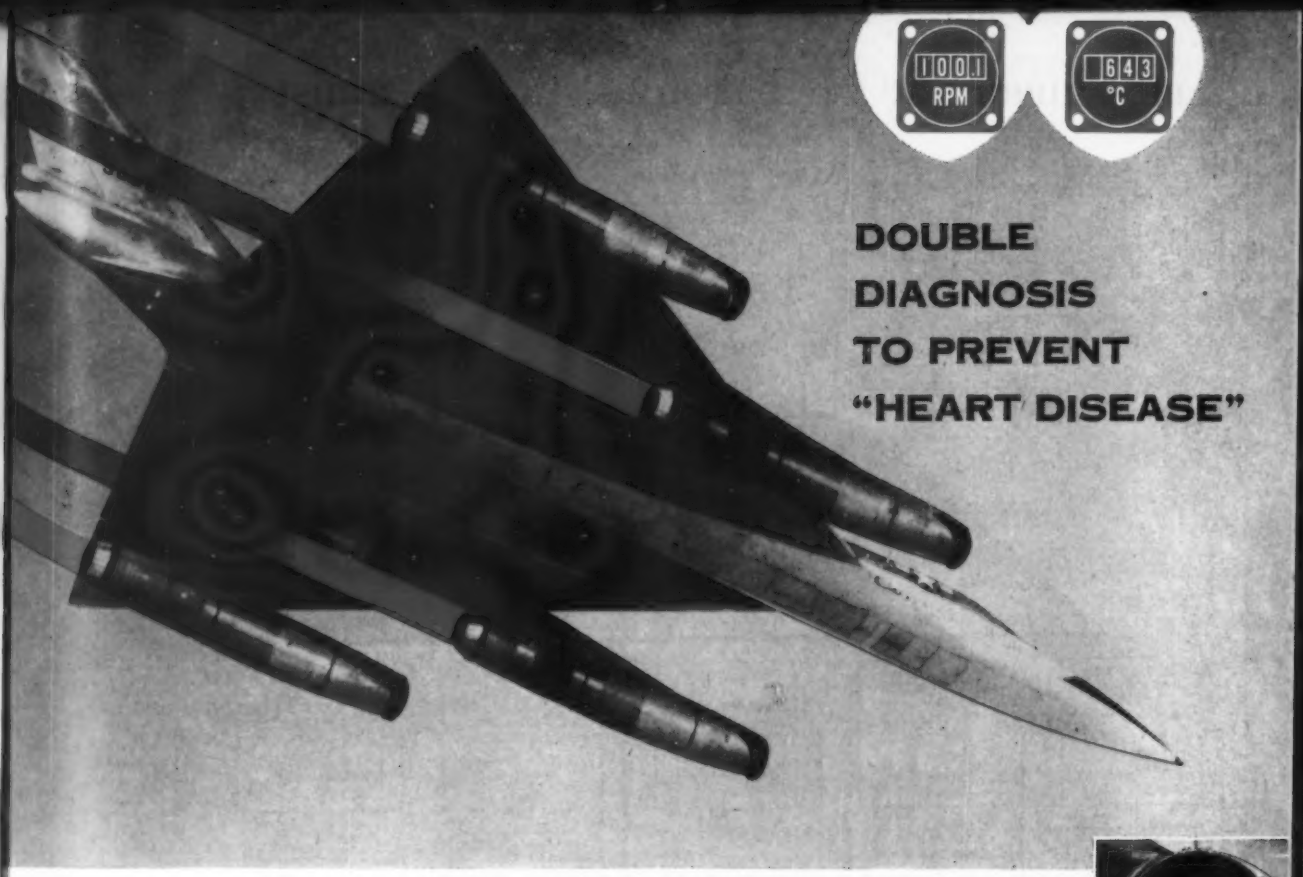
Boeing recently transferred production of 20-foot aft fuselage sections for the 707 and the KC-135 tanker to Northrop Aircraft and of 40-foot sections of the 707 to Rohr Aircraft Corp. Boeing said these changes would permit Ryan to reach maximum production more quickly on a larger program, building of 40-foot fuselage sections for the KC-135.

"Psychologically, we never like to lose business we have lined up," Ryan remarked. "But if this is a negative thing, it is only slightly so."

The KC-135 program is a large one. Maximum output of the tanker unit will be reached in late 1958 or early 1959 and will continue at that rate "for a very long time," Ryan said.

Another expanding program, he said, is the production of Firebee drone missiles used for targets and field tests. Thus far in 1957 the company has received $20 million in orders for various versions. The firm has a major stake in another jetliner program through an initial $20-million contract for power packages for the Douglas DC-8.

Ryan said the company's learning curve is dropping on the KC-135 and Firebee programs, but is still rising on the DC-8 project. He added that Ryan's hiring rate in San Diego has leveled off because the capacity of its facilities is virtually exhausted. At the new Torrance plant, eventual employment of 1,500 is anticipated. As of July 31, Ryan had 8,379 employes, compared to 5,298 on July 31, 1956.



DOUBLE DIAGNOSIS TO PREVENT "HEART DISEASE"

...BY THE B&H JETCAL® ANALYZER

Two of the most important factors that affect jet engine life, efficiency, and safe operation are *Exhaust Gas Temperature (EGT)* and *Engine Speed (RPM)*. Excess heat will reduce "bucket" life as much as 50% and low EGT materially reduces efficiency and thrust. Any of such conditions will make operation of the aircraft both costly and dangerous. The *JETCAL Analyzer pre*determines accuracy of the EGT and (interrelatedly) Tachometer systems and isolates errors if they exist.

The *JETCAL* ANALYZES JET ENGINES 10 WAYS:

1) The JETCAL Analyzer *functionally* tests EGT thermocouple circuit of a jet aircraft or pilotless aircraft missile for error *without running the engine or disconnecting any wiring*. GUARANTEED ACCURACY is ±4°C. at engine test temperature.

2) Checks individual thermocouples "on the bench" before placement in parallel harness.

3) Checks thermocouples within the harness for continuity.

4) Checks thermocouples *and* paralleling harness for accuracy.

5) Checks resistance of the Exhaust Gas Temperature system.

6) Checks insulation of the EGT circuit for shorts to ground and for shorts between leads.

7) Checks EGT Indicators (in or out of the aircraft).

8) Checks EGT system with engine removed from aircraft (in production line or overhaul shop).

9) Reads jet engine speed while the engine is running with a guaranteed accuracy of ±0.1% in the range of 0-110% RPM. Additionally, the TAKCAL circuit can be used to trouble shoot and isolate errors in the aircraft tachometer system.

10) JETCAL Analyzer enables engine adjustment to proper relationship between engine temperature and engine RPM for maximum thrust and efficiency during engine run (Tabbing or Micing).

ALSO *functionally* checks aircraft Over-Heat Detectors and Wing Anti-Ice Systems (thermal switch and continuous wire) by using TEMPCAL Probes.. Rapid heat rise . . . 3 minutes to 800°F! Fast cycling time of thermal switches . . . 4 to 5 complete cycles per minute for bench checking in production.

Tests EGT System Accuracy to ±4°C at Test Temperature

(functionally, without running the engine)

Tests RPM Accuracy to 10 RPM in 10,000 RPM (±0.1%)

The JETCAL is in worldwide use . . . by the U. S. Navy and Air Force as well as by major aircraft and engine manufacturers. Write, wire or phone for complete information.

B & H INSTRUMENT CO., INC.

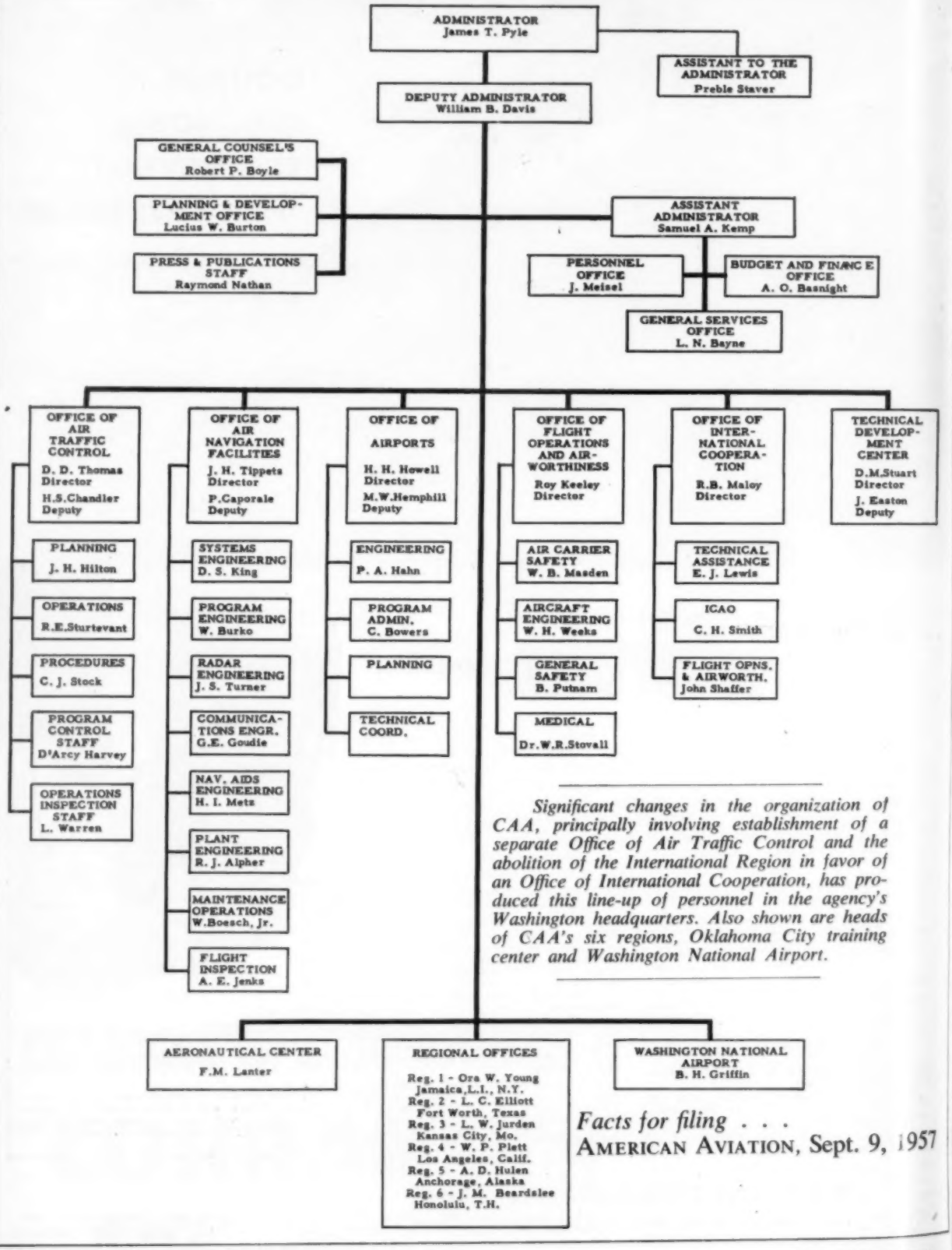
3479 West Vickery Blvd. • Fort Worth 7, Texas

Sales-Engineering Offices:

VALLEY STREAM, L.I., N. Y.: 108 So. Franklin, LO 1-9220 • DAYTON, O.: 209 Commercial Bldg., MI 4563 • COMPTON, CAL.: 105 N. Bradfield St., NE 6-8970.

Circle No. 20 on Reader Service Card.

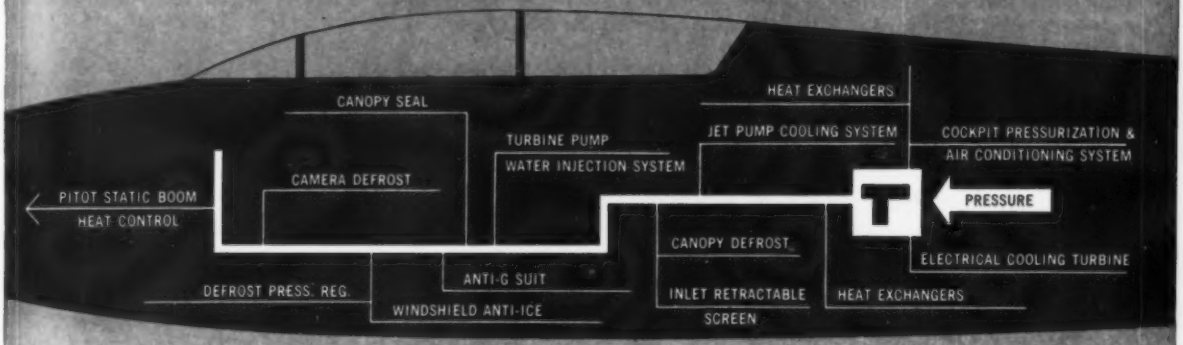
Latest lineup at Civil Aeronautics Administration

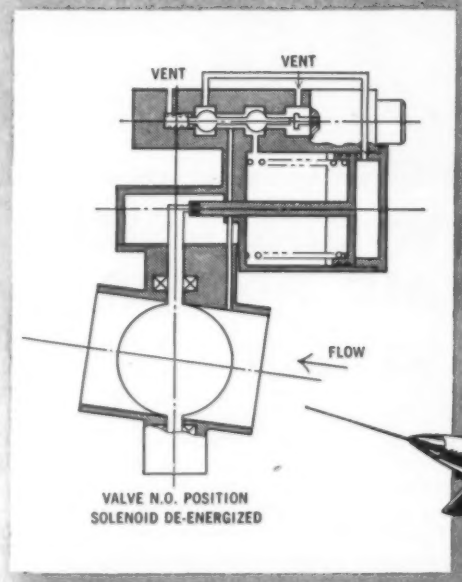


Significant changes in the organization of CAA, principally involving establishment of a separate Office of Air Traffic Control and the abolition of the International Region in favor of an Office of International Cooperation, has produced this line-up of personnel in the agency's Washington headquarters. Also shown are heads of CAA's six regions, Oklahoma City training center and Washington National Airport.

Facts for filing . . .
AMERICAN AVIATION, Sept. 9, 1957

1 all these pneumatic devices serviced by one valve!





Specifications called for a compressor bleed system shut-off valve to bleed off air from the compressor section to service all 14 pneumatic devices shown on diagram.

The valve had to be capable of operating at high pressures; a filter had to be built in so that the air from contaminated sources could be used; and because of proximity to the engine it had to function in temperatures up to 900°F.

RESULT: this Whittaker Butterfly Shut-off Valve—operated by an integral poppet-type solenoid pilot assembly. It incorporates a unique actuator that extracts pressure from the upstream port—thus eliminating external plumbing!

The unit can be adapted to any tube size and is available now.

PERFORMANCE

SERVICE: Hot air
TEMPERATURE: Ambient −65° to +325° F. Fluid −65° to +900° F.
OPERATING PRESSURE: 10 PSIG (Differential across butterfly, 205 PSIG)
ELECTRICAL POWER: 18-30 volts DC Cont. Duty Actuating current .65 amps. max. @ 30 volts and 78° F.
LEAKAGE: Max. internal leakage .25 lb/min. @ 78° F. & 205 PSIG
WEIGHT: 4.3 lbs.
LINE SIZE: 2 inches (can vary for most requirements)

Whittaker

CONTROL SYSTEMS
Fuel • Hydraulic • Pneumatic
Los Angeles • Seattle • Wichita
Indianapolis • Baltimore
Hempstead, Long Island

SEND THIS COUPON FOR COMPLETE INFORMATION

WM. R. WHITTAKER CO., LTD. **DEPT. 35**
915 N. CITRUS AVE., LOS ANGELES 38, CALIF.

Gentlemen: Please send me further information on Compressor Bleed System Shut-Off Valve, P/N 120645

Name_____

Company_____

Address_____

City_____ Zone____ State_____

another example of how

RYAN BUILDS BETTER

RYAN VERTIJET: A NEW DIMENSION FOR AIR POWER

The Air Force Ryan X-13 Vertijet—able to take off and land on its jet thrust in an area half the size of a tennis court—brings a new dimension to air power. This revolutionary concept combines missile mobility, helicopter maneuverability, and jet speed. Not dependent on vulnerable runways or carrier decks, jet VTOLs make possible wide dispersal of aircraft in land theatres or on small ships in naval task forces—and can reach fighting altitude before most other jet planes can complete take-off.

Extensive Air Force flight testing of the X-13 has dramatically demonstrated its ability to take off straight up on jet thrust... move sideways and backward at will... make the transition from vertical to horizontal... and return back to vertical for a zero-speed landing.

The unique performance of the X-13 is achieved by its advanced jet reaction control system. A product of Ryan engineering, it provides complete control of the airplane during hovering, zero-speed flight and in transition. Operated by conventional pilot's controls, the system requires no higher level of skill than that needed to fly a helicopter.

The X-13 opens a new chapter in aviation history. It began at Ryan ten years ago—the first jet VTOL program in the world. Since then, working in the closest cooperation with the Air Force and the Navy, Ryan has successfully carried out one of the most intensive and inventive engineering research projects of our time.

This imaginative and energetic effort is typical of Ryan's work—in every field of aeronautics.

BUILDING AVIATION PROGRESS SINCE 1922

Aircraft • Power Plants • Avionics

Ryan Aeronautical Company, San Diego, Calif.

Ryan

Circle No. 23 on Reader Service Card.

Wanted: nuclear-resistant electronic systems

Air Force speeds search for ways of preventing radiation damage to air and ground defenses

by William Beller

BUILDERS OF WEAPONS SYSTEMS are becoming increasingly aware of a new and grave design problem: how to decrease system vulnerability to nuclear radiations, particularly where electronic gear is concerned.

Up to now, the problem has been considered mainly by engineers working on the WS-125 nuclear bomber program. But today the problem also faces designers of ground-based equipment, especially equipment for ICBM launching sites.

To reach an early solution, USAF is speeding up research to develop radiation-resistant electronic components and protective shielding. But satisfactory answers are still a long way off.

The chief problem confronting designers of airborne radiation-resistant components is weight. One cynical observer recently described the projected atomic bomber as "an airplane in front, an airplane in back, and a brick house in the middle." So far, this comment is uncomfortably near the truth, which may account for the recent slowdown in the WS-125 program.

Among the companies seeking means to minimize radiation damage to electronic components are: Admiral Corp., Boeing Airplane Co., Convair, General Electric, Hughes Aircraft Co., North American Aviation and the Radio Corp. of America.

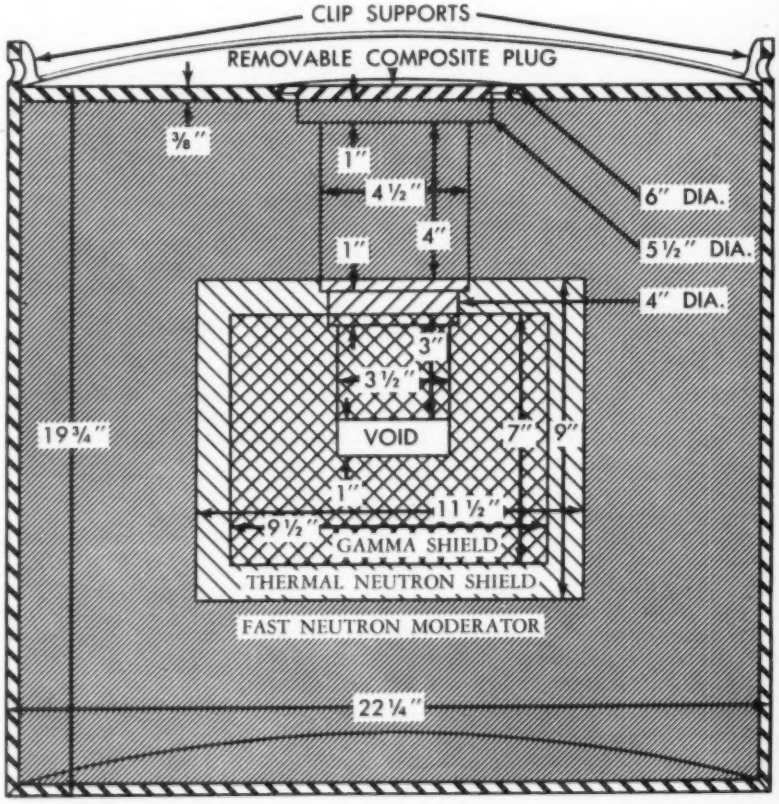
In a current USAF program, components are instrumented to measure the variation of their electrical characteristics with exposure to nuclear radiations.

USAF helps gather design data

The results of this program, according to J. Robert Milliron of the Electronic Components Laboratory, Wright Air Development Center (ARDC), are being presented in graphic and tabular form. This should make it easier for engineers to select appropriate components.

Inherently harmful radiations are alpha and beta particles, slow (thermal) and fast neutrons, and gamma rays. Only the last three emissions cause design problems because the first two are easily stopped by a fraction of an inch of solid substance.

Crystalline inorganic materials, such as metals and ceramics, are relatively insensitive to nuclear radiations. However, the story is quite different for crystalline organic materials used in electronic work. As an example, Teflon, which is inert, stable and fairly resistant to temperature, deteriorates in several minutes in a moderate radiation flux. It is generally accepted that fast neutrons are more damaging to a material than slow neutrons. Major damage in metals is caused by the trans-



STAINLESS STEEL CASE

GRAPHITE POWDER DISPERSED IN POLYETHYLENE PLASTIC

ANHYDROUS POWDERED BORON OXIDE (B_2O_3) DISPERSED IN POLYETHYLENE PLASTIC

POWDERED LEAD DISPERSED IN POLYETHYLENE PLASTIC

Note: LOAD POLYETHYLENE WITH MAXIMUM AMOUNTS OF SHIELDING MATERIALS CONSISTENT WITH WORKABILITY AND FABRICATION.

MOLDED nuclear radiation-resistant shield. Weight including exterior BeO reflecting film is 100 lbs. Electronic gear occupies "void."

mutation of the material as a result of neutron capture.

The chemical bonds holding an organic substance together are fairly weak. Although relatively minor energy additions can reinforce these bonds in certain plastics by cross-linking, larger energy inputs can rupture the bonds and cause a complete breakdown of the material's molecular structure.

When gamma rays interact with electrons, which form the chemical bonds, molecular destruction on a grand scale begins. Neutrons cause similar damage by displacing atoms from their normal lattice positions, thereby causing holes in the material. In cystalline materials, the electronic damage caused by a neutron particle is about 3,000 times that caused by a gamma photon having an equal energy.

Examples of radiation damage

The incident neutron radiation flux *(nv)* from an airborne explosion is many times higher than the radiations from a nuclear reactor, and lasts only a few milliseconds. For this reason, radiation dosages are often quoted on the basis of integrated flux, *nvt*, in neutrons/sq. cm. (The unit *nvt* is the product of the number of neutrons per cu. cm., neutron velocity in cm./sec., and time.)

Outside of the blast damage area, the integrated neutron flux would be between 10^{12} and 10^{17} *nvt*, depending on bomb altitude and size.

Where damage is done to an object or material, it is assumed that the amount of damage is proportional to the total amount of the input energy. This assumption does not appear to be true for radiation damage. It was found that for two identical samples subjected to the same total radiation flux *(nvt)*, but where one was subjected to a lower flux for an adjusted increased period, the amount of damage differed significantly.

Milliron gave an example taken from an experiment with wire insulation. Here, the resistance of the insulation—the resistance from the conductor to the shield—was used to indicate the extent of damage.

One of two wires was exposed to radiations at a flux level twice that of a second wire. After equal total dosages, the resistance of the first insulation, which had been immersed in the higher flux, was about half that of the insulation that had been immersed in the lower flux.

Milliron concludes that an analysis of radiation effects should include an estimate of the flux expected together with the time the component is expected to operate in this flux. In addition, the type radiations must also be specified, that is, fast or slow neutrons, or gamma rays.

Several examples of radiation damage arising out of the WADC tests are:

A rectifier tube was irradiated in a flux of 10^{17} *nvt*. The component was instrumented and operated in a normal circuit. It was found that the emission current increased from 320 ma to 860 ma in 10 hours. The tube failed after 130 hours.

In WADC's study of capacitors, it was found that the fixed mica types experienced little change in capacitance and no failures during irradiation. The ceramic types experienced larger changes in capacitance but no failures. The oil-filled types gassed, the cans bulged and leakage occurred. Large changes in capacity and dissipation factors arose.

Precision wire-wound resistors showed little change in a radiation stream. The carbon composition type experienced a decrease in resistance from one to nine percent, depending on the brand tested.

Deposited carbon resistors exposed to a flux of 6×10^{11} neutrons/sq. cm. and a total flux of 10.5×10^{18} neutrons/sq. cm. showed changes from 1.8 percent to 10 percent in resistance values but with no direct failures.

Four 1N58 germanium rectifiers were irradiated by an integrated thermal neutron flux of 7×10^{16} neutrons/sq. cm. One unit was destroyed by the radiations and the remaining ones showed changes in forward and back currents in excess of 20 percent.

Silicon crystal rectifiers were tested in an integrated thermal flux of 0.5×10^{17} neutrons/sq. cm. Five units were destroyed during the test and three units suffered minor damage.

All experiments showed a reduction in the dielectric qualities of all types of insulation tested. The resistance of Teflon insulation was found to be reduced from 10^{11} ohms to 10^{6} ohms in a total dosage of 10^{17} *nvt*. This loss is quite significant in systems with high impedance circuitry.

Shielded components

To some engineers, the use of nuclear-radiation shielding for electronic devices is a confession of design failure. These engineers ask for devices that in themselves are adequately resistant.

Arguing against this thesis are those who say (1) that some radiations are so intense that even shielding would fail, much less unshielded components, and (2) that even if we assume the design of highly radiation-resistant components, such a design could easily call for a group of components whose excess weight may in effect include a shield.

The design approach attracting much attention uses components with some radiation resistance, such as ceramic-type tubes, plus an economical shield. John R. Hendrickson, Sr.,

Transistor damage

Integrated neutron flux (*nvt*) at which permanent damage occurs in various types of transistors.

Transistor type	Damaging flux
Thick-base silicon	10^{11} to 10^{12}
Thick-base germanium .	10^{11} to 5×10^{12}
Medium-base silicon ..	10^{11} to 5×10^{12}
Medium-base germanium	5×10^{11} to 10^{13}
Thin-base silicon	10^{13} to 3×10^{13}
Thin-base germanium ..	10^{13} to 5×10^{14}

Neutron absorption coefficients

Neutrons—linear absorption coefficients u (1/cm.) for various shielding materials as a function of energy.

Energy (Mev)	0.5	1.0	1.5	2.0	3.0	5.0
Gold	0.372	0.313	0.338	0.378	0.432	0.378
Tantalum	0.431	0.415	0.410	0.402	0.376	0.315
Tungsten	0.460	0.441	0.441	0.436	0.430	0.361
Aluminum	0.193	0.157	0.181	0.199	0.157	0.136
Iron	0.253	0.181	0.211	0.253	0.270	0.312
Nickel	0.352	0.302	0.293	0.293	0.302	0.338
Zirconium	0.372	0.302	0.237	0.209	0.180	0.170
Lead	0.109	0.208	0.184	0.188	0.244	0.234
Hydrogen	0.328	0.229	0.183	0.156	0.122	0.087
Water	0.592	0.549	0.301	0.253	0.194	0.147
Paraffin or polyethylene	0.605	0.430	0.344	0.291	0.225	0.172
Carbon	0.342	0.262	0.206	0.171	0.126	0.120

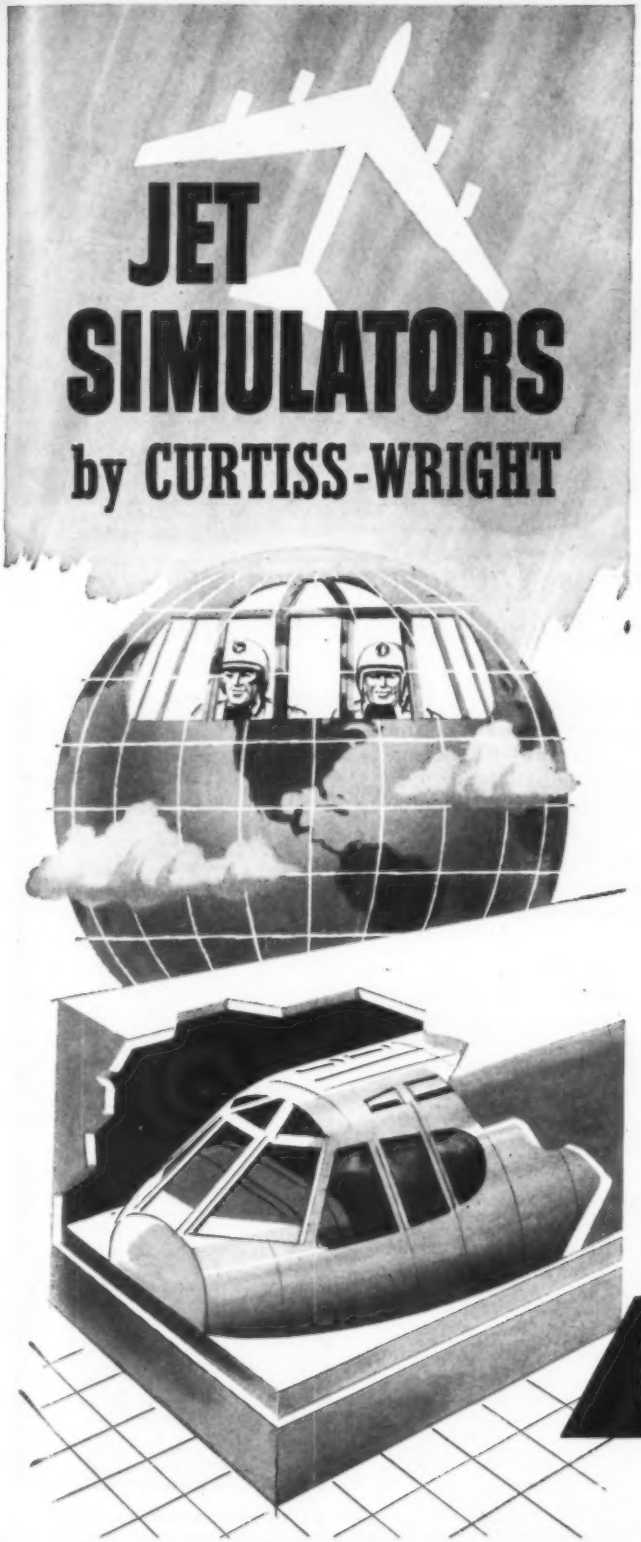
Boron, 0.025 ev (thermal neutrons), 139.0
Lithium, 0.025 ev (thermal neutrons), 3.36

Gamma absorption coefficients

Gamma rays—linear absorption coefficients u (1/cm.) for various shielding materials as a function of energy.

Energy (Mev)	0.05	0.1	0.5	1.0	5.0	10.0	Remarks
Uranium	148	24.1	3.52	1.48	0.83	0.98	Best
Lead	67.8	62.2	1.70	0.81	0.47	0.56	Most practical
Iron	14.6	2.85	0.68	0.47	0.25	0.23	For high temp.
Aluminum	1.00	0.46	0.23	0.16	0.076	0.062	Poor
Air (sea level)	27.0*	19.0*	12.0*	8.1*	3.5*	2.6*	*ut* good
Air (atomic bomb detonation at sea level)					3.2*		Average

*multiply by 10^{-6}



JET SIMULATORS by CURTISS-WRIGHT

Crews for U.S. Air Force Giant BOEING B-52 Jet Bomber pre-fly GLOBAL MISSIONS in the electronic SIMULATOR

Before crews of the USAF's biggest and fastest bomber take to the air, they have mastery of their aircraft. Hours of flying in the Boeing B-52 Simulator built by Curtiss-Wright have coordinated each man to his job . . . and the crew to its team function . . . down to the exact reading of every instrument of the plane in flight.

Similarly, integrating the coming jet transports into today's complex traffic patterns calls for experience that can no longer be gained in the air alone. Crews must be acquainted with new flight and communications procedures, holding techniques . . . with new navigation aids and airborne equipment. This calls for precision flight simulation – on the ground. Already, such major airline operators as Pan American World Airways have planned DC-8 and Boeing 707 familiarization programs built around Jet Simulators designed by Curtiss-Wright. The airlines and the military alike have selected Curtiss-Wright on the basis of its proven experience with every type of Simulator.

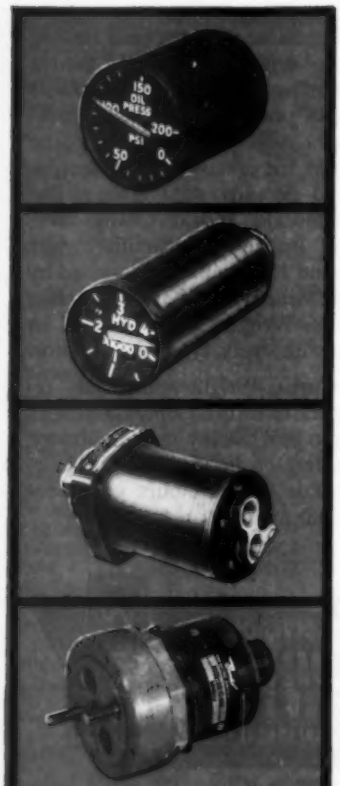
Simulators by Curtiss-Wright realistically reproduce every aspect of aircraft operation, with the highest precision and fidelity in the industry. They add to the safety of flight, save millions of dollars and thousands of man-hours yearly for both commercial and military operators.

ELECTRONICS DIVISION
CURTISS-WRIGHT
CORPORATION • CARLSTADT, N. J.

YOUNG MEN! JOIN THE U. S. AIR FORCE
Investigate Career Opportunities at Your Nearest Recruiting Office

CURTISS-WRIGHT DEHMEL training equipment licensed under basic patents of R. C. DEHMEL AND CURTISS-WRIGHT. Canadian Licensee: Canadian Aviation Electronics Ltd., Montreal – British Licensee: Redifon Ltd., London – French Licensee: Société d'Electronique et d'Automatisme, Paris

For Remote Indications, Montrose Division's 1-inch Synchro Indicator Provides Super-accuracy, Rugged Design, Easy Readability



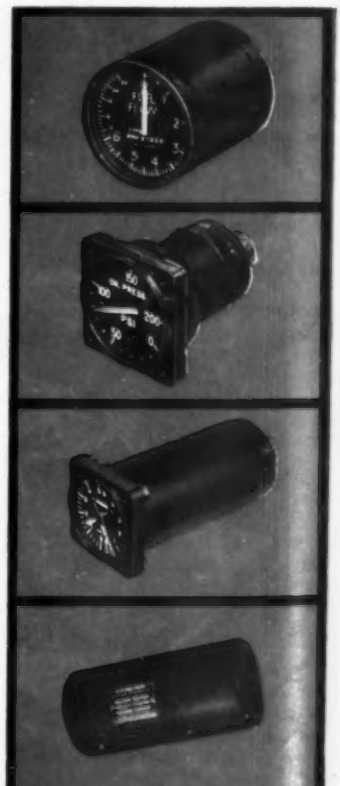
Montrose Division presents Type 26800—a single precision synchro pressure indicator with a .950-inch dial aperture—for measuring oil, manifold, hydraulic and torque pressures in a variety of ranges—depending on specific operating requirements.

Where desired, it is available with various dials to indicate fuel flow, heading, position, and other factors, when used with an appropriate transmitter.

Electrically connected to a remotely located synchro transmitter to provide a visual indication of transmitter output signal, its helium-filled and hermetically-sealed construction assures long, trouble-free life under adverse environmental conditions. Dial and pointer markings are available with R-410-AB radium, AN-L-1 fluorescent or matte white paint.

Input power required—26 volts, 400 cycles, single phase. Power rating—3.12 VA at 0.19 power factor. Operating temperature range is −55°C to +70°C. Size: One-inch diameter; weight: 2.85 oz.; accuracy: ¾°.

Montrose Division manufactures a complete line of synchronous indicators and transmitters, servoed indicating systems, warning units, heavy-duty control switches for pressure applications, and dynamotors. Montrose Division, Bendix Aviation Corporation, South Montrose, Pa.



West Coast Sales and Service Office—117 East Providencia Avenue, Burbank, Calif.; *Canadian Sales Office*—Aviation Electric, Ltd., 200 Laurentien Blvd., Montreal, Quebec; *Export Sales and Service*—Bendix International, 205 East 42nd St., New York 17, N. Y.

MONTROSE DIVISION
SOUTH MONTROSE, PA.

Bendix
AVIATION CORPORATION

Circle No. 24 on Reader Service Card.

Radio Corp. of America nuclear radiation engineer, said at a recent Defense Department conference on research and development that an adequate shield could be designed for a reasonable price and weight. It could reduce incident radiation intensity on an electronic system by a factor of 10.

The need for shielding could spring from one of several sources:

(1) The split shield concept for nuclear aircraft, which calls for encasing the crew and the reactor in separate shields, is generally effective in protecting electronic circuits providing the circuits are sufficiently far away from the reactor.

Still, some circuits must be placed within the reactor shield, possibly for control or safety purposes. Particularly vulnerable in this location are semiconductors, electrolytic condensers and insulation.

(2) Radiations arise when an airborne vehicle experiences a near-miss from an atomic explosion. Equally prone to damage are ground-based installations such as missile guidance and launching equipment, and search equipment.

(3) When an aircraft passes through an atomic cloud generated by underground or surface detonation, intense gamma radiations are experienced, emitted by billions of radioactive fission products in the cloud.

Such radiations could affect electronic circuits, thereby destroying guidance accuracy. Thus, a gamma shield in addition to a neutron shield may be needed. The exact gamma spectrum in the vicinity of an atomic explosion is not yet known. For design purposes Hendrickson recommends that engineers use a value of 2 Mev.

Better known is the spectrum of fission neutrons, the greatest number of which have an energy of about 1 Mev.

Many materials used in shield

An optimum shield for attenuating nuclear radiations comprises a unit made up of at least four different materials. The order in which these materials are combined is highly important.

Iron and lead are leading candidates for slowing down neutrons bearing energies greater than 1 Mev. Each of these elements has a high neutron-absorption coefficient. From a design point of view, lead may be eliminated because of its low melting point and low strength. This leaves iron for the shield's outer layer.

The second layer must absorb fast neutrons with energies less than 1 Mev, a regime where iron begins losing its neutron-absorption efficiency. Here, hydrogen comes out best. But as a gas, the element is useless as a shielding material. Hendrickson chose polyethylene as an acceptable substitute, since it contains a high percentage of hydrogen.

Also efficient in showing fast neutrons are graphite and water in the form of crystalline hyrates.

For attenuating the slower or thermalized neutrons, a third layer is needed. Hendrickson warns that this shield should not be one that is apt to capture neutrons only to emit secondary gamma radiations. Cadmium, for example, would not be suitable because it emits strong "capture" gammas despite the material's ability to absorb thermal neutrons.

Because of their high thermal neutron-capturing capabilities, lithium or boron is recommended for the third layer (AMERICAN AVIATION, July 15, p. 47). These elements are best used in the form of one of their compounds.

Upon neutron capture, lithium and boron emit alpha particles (helium nuclei), which can easily be absorbed by an inner shield.

Role of rare earth elements

A modern class of materials, one of which could be chosen for the thermal neutron shield, is the lanthanons or rare earths. This class includes hafnium, samarium, gadolinium and europium, all of which are excellent neutron absorbers.

Hendrickson claims for this function that europium in oxide form is the best choice of the lanthanons. However, price is a problem, especially since europia (europium oxide) is selling for $10/gm. Until the cost is appreciably reduced, which it soon may be, the europia shield would be uneconomical for most applications.

One technical disadvantage of europium is its secondary emission of intense gamma rays, which can have distressing effects upon radiation-prone components.

Hendrickson recommends placing the gamma shield, which immediately surrounds the electronic equipment, inside the neutron-absorbing sections of the composite nuclear shield. In this way, the high intensity gamma radiations originating in the outer portions of the composite shield are considerably reduced, as are incident gamma radiations.

Lead is the best gamma shield material. On a weight basis, hydrogen also fares well in addition to its ability to slow down thermal neutrons.

One of the more obvious ways of reducing shielding requirements is to re-

Reflecting materials for neutrons

Element or compound	Moderating ratio	Remarks
Heavy water (D_2O)	5,000	Highest ratio
Beryllium oxide (BeO) ...	183	Good
Carbon (C), graphite	165	Good
Beryllium carbide (Be_2C) .	145	Good
Beryllium (Be) ...	145	Good
Light water (H_2O)	62	Fair
Polystyrene	62	Fair
Paraffin ($C_{25}H_{52}$) ...	62	Fair

He does his job three times as fast with a Robinson . . . the original and first quality wire twister. He saves two thirds the time it used to take to safety wire. Your labor force can do the same . . . save you up to $144.00 on every engine wired, if you will provide them with this Robinson 3-way tool: plier, cutter, twister.

ON EVERY ENGINE HE SAFETY WIRES

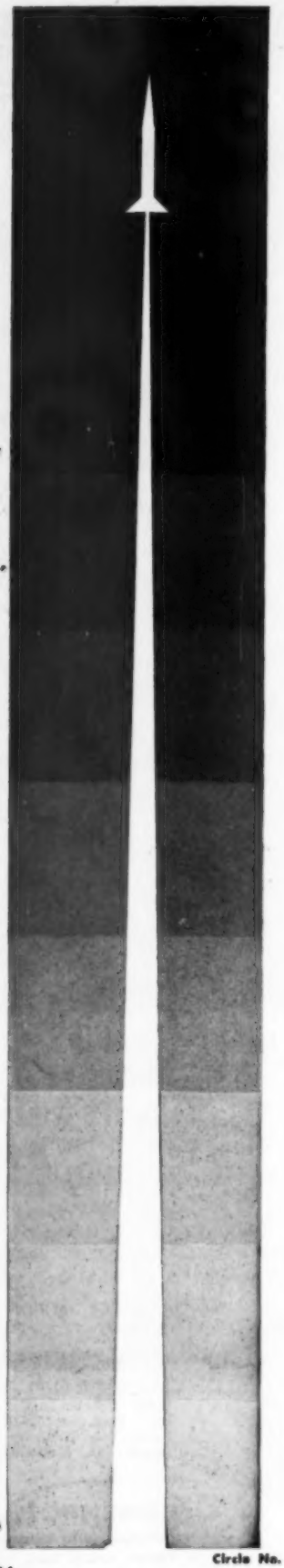
WRITE TODAY FOR THIS FULLY ILLUSTRATED BROCHURE

Complete details are yours in this colorful new brochure. Write to

Ralph C. Robinson Co., Inc., Dept. A, 2516 Crosby Way, North Sacramento 15, California

THE ROBINSON WIRE TWISTER

Circle No. 25 on Reader Service Card.



ARO

for advanced know-how in

CRYOGENIC
EQUIPMENT

Aro is proud to announce completion of a new Cryogenics Center . . . to meet the challenge of "ceiling unlimited" for applications of low temperature equipment and accessories. With this new technical headquarters and plant, Aro provides outstanding modern facilities for work in Cryogenic Equipment for missile and airframe applications.

Advance Steps by ARO!

- Thoroughly trained engineers and physicists in Cryogenics.
- Fully equipped laboratory facilities for low temperature development and studies.
- Unlimited manufacturing facilities to produce products on schedule and in quantities.
- Trained field engineers for liaison work between customer and factory.

Aro has proved its leadership in the field of Cryogenics. Let us help solve your Cryogenic Equipment problems. Write, wire, or phone.

THE ARO EQUIPMENT CORPORATION
Bryan, Ohio, Aircraft Division
Plants in Bryan, Cleveland, Los Angeles, and Toronto

ARO ®

Pioneers in Cryogenic Equipment

Circle No. 26 on Reader Service Card.

flect away part of the incident radiations. Several operational nuclear reactors now use beryllium or heavy water reflectors (moderators) for such a purpose. A beryllium oxide film could be used to cover the outer iron layer of the composite shield.

Use of design formula

For determining the thicknesses needed for the various layers of the shield, the following equation may be used. It applies to gamma and neutron radiations as long as the appropriate total absorption or removal coefficients are known.

$$I = I_o \exp(-ut),$$

where t (cm.) is thickness of shield material, I (neutrons/sq. cm.) is radiation intensity after passing through the shield, I_o (neutrons/sq. cm.) is radiation intensity on the shield, and u (1/cm.) is the linear absorption or removal coefficient.

The sample shield designed by Hendrickson consists of an outer layer of beryllium oxide followed by successive layers of iron (stainless steel), graphite powder-impregnated polyethylene, boron oxide powder-impregnated polyethylene, and lead. Thickness of each layer was found by the above formula, and absorption coefficients from appropriate tables.

If the incident radiation energy varies over a wide spectrum, it may be necessary to design additional layers in the shield to cover fully the incident energy. Good practice is to provide a margin of safety in the calculations by using the lowest absorption coefficients.

Air is shielding element

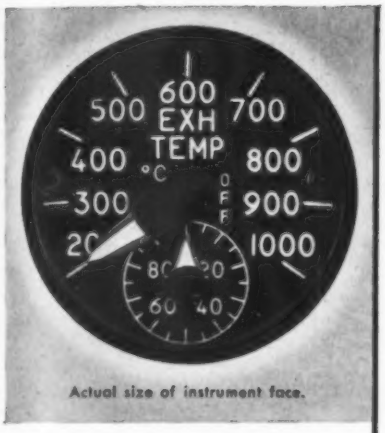
Air may be considered as part of the composite shield, particularly where the shield is appreciably removed from the source of nuclear radiations. Even though u for air is small, the thickness of the air mass may be large, and the product effective in the shielding formula.

At high altitudes, though, where the air density is very small, one cannot count on the atmosphere to help attenuate the nuclear radiations. Only distance is of aid here and it decreases radiation intensity inversely with the square of the distance from the radiation source.

Although shielding electronic components and circuits can reduce the transmitted incident radiation energy by a factor as high as 10, it is apparent that this protection will increase the weight burden.

A limit will soon be reached, which may be recognized as that one calling for a shielding weight and volume that would prevent carrying out the intended mission. Shielding, then, should be considered as a design tool that we would prefer not using, but that we may have to use, at least for early nuclear-powered aircraft and other equipment that must survive in a nuclear-radiation environment.

NOW FROM FORD INSTRUMENT ALL-SILICON-TRANSISTORIZED EXHAUST TEMPERATURE INDICATOR



Actual size of instrument face.

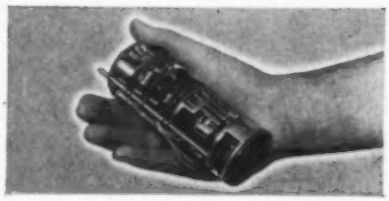
Developed for Navy BuAer
For first time commercially available

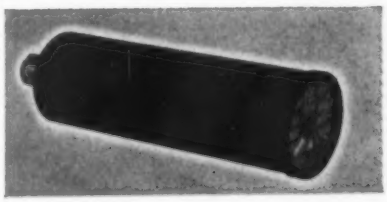
Ford Instrument's Engine Exhaust Temperature Indicator was developed for the Navy Bureau of Aeronautics and is now available to other users. It is a self-contained unit which continuously displays temperature over a 200-1000°C range with ±5°C accuracy. Of extremely compact construction, it has less than one-third the volume and weight of comparable vacuum tube units. Silicon transistors are used throughout, enabling the ETI to withstand a wide range of ambient temperatures. Weight of the unit is only 16 oz.

Check These Ten Superior Features

- Self-contained
- Instantaneous warm-up
- 2 sec. full scale response
- Wide environmental range
- No vacuum tubes used
- ±5°C accuracy
- Integral lighting
- Extreme compactness
- Integral power failure indicator
- No calibration required.

High Applicability
Coupled with precision measurement


Miniaturization provides a 2" diam. x 6" long self-contained unit. (Unit is shown with case removed.)


FICo's ETI is packaged in a single hermetically sealed case.

The FICo ETI is used for measuring exhaust temperature in turbo props, turbo jets—or in any other gas turbine within its range. It is a panel-mounted unit. Its high accuracy enables the pilot to closely observe engine temperature to ensure safe and efficient engine operation.

The fast response of the ETI makes it highly suitable for multiple thermocouple installations. It can be used as a monitoring unit with any number of chromel-alumel thermocouples in conjunction with a suitable switching device.

The ETI is highly applicable to laboratory flight test applications. In addition, with modification, it can be used in conjunction with airborne time-temperature recorders.

FORD INSTRUMENT CO.
Division of Sperry Rand Corporation
31-10 Thomson Avenue
Long Island City 1, New York

California Office
260 South Beverly Drive
Beverly Hills, Calif.

Dayton Office
29 West 4th Street
Dayton, Ohio

FORD INSTRUMENT CO.
Department ETI
31-10 Thomson Avenue, Long Island City 1, N. Y.
Please send me your brochure on the Exhaust Temperature Indicator

Name _____ Title _____
Company _____
Street _____
City _____ State _____

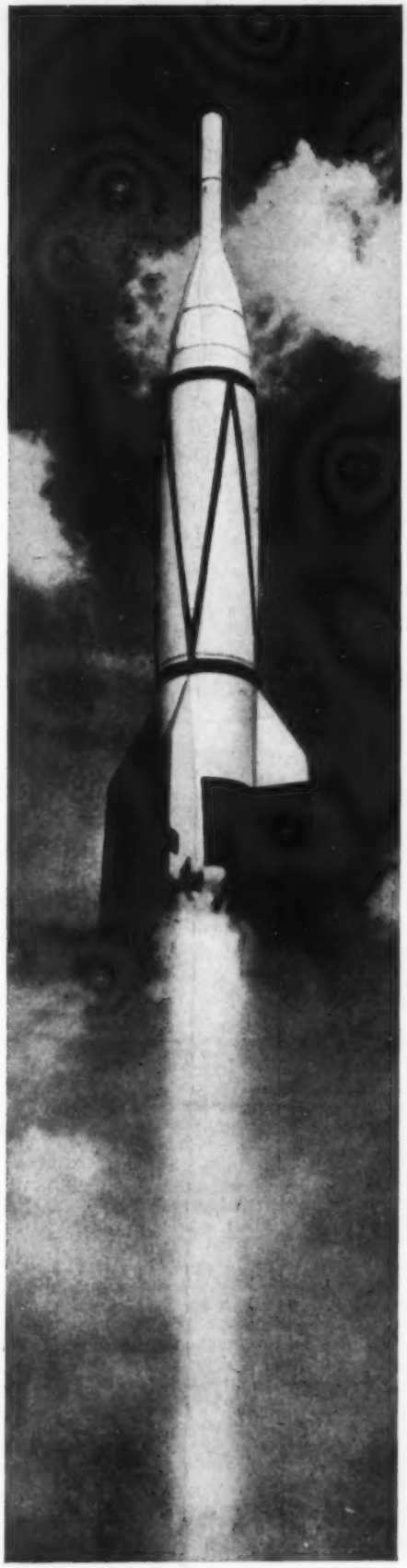
Lunar craters as seen through an astronomical telescope.
The puzzle of what's on the other side may soon be answered.

World's oldest mystery soon to be solved

Ever since man has had the imagination to ponder *any* problem, he has wondered what lay on the dark side of the moon . . .

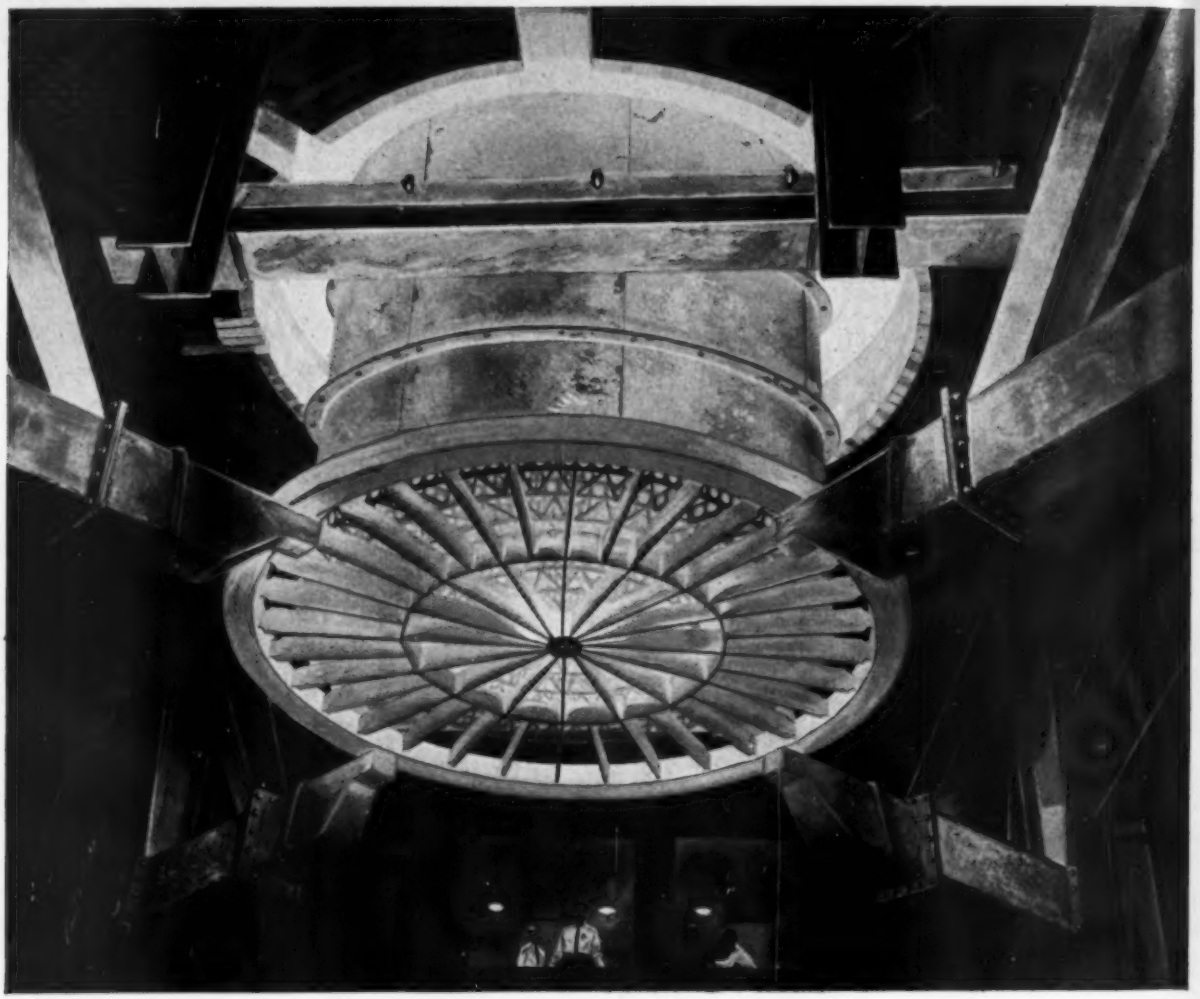
Now, engineers predict that rockets carrying cameras or TV will circle Luna within five years and show us her other face.

At Douglas Aircraft, where one of the first rocket and missile projects was set up in 1941, practical investigations have helped show the way to lunar circumnavigation. They have led to more effective missile guidance systems . . . helped establish basic principles of air-to-air rocket fire . . . led to use of such heat-resistant materials as titanium, ceramics, and plastics. Douglas engineers have investigated *space physiology and psychology*—how man will react in the weightfree glare of space—and even investigated new kinds of power, engines that may use ions or light rays to reach the stars.



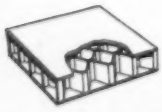
Wac-Corporal, an early Douglas rocket, takes off in the nose of a captured V-2 to set what was then a world altitude record. Douglas has since developed such weapons as *Nike*, the new *Nike-Hercules*, and the Army's potent *Honest John*, which can carry a nuclear warhead. Even more exciting projects—still classified—are going full speed ahead at Douglas.

Depend on
DOUGLAS
first in Aviation



Solar Advanced Technology

All-metal honeycomb sandwiches solve aircraft heat, weight problems



Aircraft and missile designers continually increase their demands for lighter, heat-resistant materials. Solar technology is helping to solve this heat-weight problem with all-metal honeycomb sandwiches. The new product—called Solite®—is a strong, fatigue-resistant structure of foil-thin ribbons bonded between metal skins.

Large new electric furnaces were designed by Solar to braze these sandwich structures. Capable of operating at high temperatures with extreme purity of atmosphere, the furnaces incorporate many features which make them virtually unique.

Tailor-made for use in advanced aircraft and missiles, Solite offers a practical solution for exacting heat and weight requirements. For 30 years Solar has pioneered in welding and brazing high alloy steels that will stand up under extreme service conditions. Perhaps Solar can bring a fresh viewpoint to your difficult metal-working problems. Write Dept. D-81, Solar Aircraft Company, San Diego 12, California.

SOLAR
AIRCRAFT COMPANY
SOLAR
SAN DIEGO DES MOINES

ENGINEERS WANTED *Unlimited opportunities, challenging projects, good living with Solar! Write for new brochure.*

New "Solar Advanced Technology" facilities brochure is of value to you . . . Write for it.

DESIGNERS, DEVELOPERS AND MANUFACTURERS • GAS TURBINES • AIRCRAFT AND MISSILE COMPONENTS • BELLOWS • CONTROLS • COATINGS • METAL ALLOY PRODUCTS

Circle No. 44 on Reader Service Card.

Army, Air Force agree: bigger role ahead for electronics

Secretary Brucker, Gen. Schriever tell WESCON convention weapon systems of future will depend heavily on industry

by Henry P. Steier

ARMY AND AIR FORCE have indulged in another round of rocket-rattling, defense of their different methods of development and procurement, and ways and means of coping with new government military economy measures.

Latest round took place at the Western Electronics Show and Convention in San Francisco where Secretary of the Army Wilbur M. Brucker and Maj. Gen. Bernard A. Schriever, Commander of the AF Ballistic Missile Division, reported to the electronics industry on their respective ballistic missile developments in press conferences and convention talks.

Both contenders in the IRBM competition, however, emphasized the increasing importance of electronics in future weapon systems and held out hopes for minimum effects of recent military cuts on the electronics end of military business.

Lauds Jupiter

Brucker told WESCON the Jupiter missile development is a "splendid example of what we want and how to get it." The U.S. is ahead of Russia, he said, in getting such a weapon, the Army has already accomplished far more than it promised and the Jupiter is "slightly ahead of schedule."

The philosophy of "contracting out" everything leads to false starts, frequent modifications and unsatisfactory end items and it is wasteful, time-consuming and costly, Brucker said. The Army, he added, cannot afford to develop a multitude of ideas for weapons and equipment on a "cut and try" basis.

Supporting Army's method of using its arsenals for R&D, Brucker said it is best adapted to getting the most for the money. He warned that industry competition is going to be keener than ever and that industry will be held to an increasingly strict accounting on the basis of quality and timeliness of performance in producing for military needs.

On things to come in electronics for the Army, Brucker said the defensive weapon against the ICBM will depend "almost entirely" upon electronics, especially electronic detecting and computing devices.

These will be needed to collect and correlate a great amount of information almost instantaneously and direct the counter-missile. The anti-missile is "in the midst of development in the Department of Defense," Brucker said, adding that progress is being made in Russia to perfect such a weapon.

The electronics industry will have a big stake in future weapons, for logistical and reconnaissance missions, Brucker predicted. Because manned aircraft will not be able to survive over combat areas, missiles capable of moving men and supplies, and missiles and extremely cheap drones for reconnaissance will be needed.

The reconnaissance vehicles will obtain information of enemy movements, weather data, measure radioactive fallout and locate enemy support installations. Brucker also predicted more electronics will be needed for an Army with three-dimensional mobility.

New families of transistorized equipment, air navigation and control systems are aiding this mobility, he said.

Brucker said one reason he was in the San Francisco Bay area was to "know more about what's out here," and that he planned to visit Varian Associates, Hiller Helicopter, North American Aviation Rocketdyne division, Hughes, Firestone, Jet Propulsion Laboratory.

He said his visit did not portend a step-up in Army take-out from the area and also that the Army plans no cutbacks from West Coast Industry, although they might be applied elsewhere.

In what appeared to be an explanation of the real meaning of recent mishaps with AF tests of the Thor and Titan missiles and a rap at favorable publicity for the Army on recent successful Jupiter firings, Gen. Schriever told WESCON production and operational capability are the "real" end goals of Air Force planning.

"A single shot or a few shots of a missile, built breadboard fashion, but its inventors in a closely supervised model shop, may be a satisfactory approach to illustrate a principle," Gen. Schriever said.

But, he added, "the key problem is to organize the program to assure the efficient working out of engineering details, some by theory and some by experiment, the attainment of reliability through a great deal of testing, and an industry capability to reproduce the results in quantities required by a military force."

Tests must be coordinated

To have a 50% chance for completely successful flight, each of many subsystems in a missile must be counted on for about a 90% chance of operating safely, Schriever noted.

But, he said, this does not mean the first flight test should be delayed until testing on the ground has caused all elements to reach a stage of reliability where nothing remains but tests on final interactions in the operating environment.

The test philosophy adopted by the Air Force was made after the experience of all leaders of the guided missile and associated arts was reviewed, Gen. Schriever said. Some experts believe the best approach was to move rapidly and analyze every completed test result and make improve-

Robot navigator ready for delivery to AF

First production models of an all-weather robot navigator, developed jointly by Ford Instrument Co. and the Air Force, is scheduled for delivery to the Air Force within the next several weeks, according to the manufacturer.

Known as the ASN-7, the system was first flight-tested and evaluated in 1955 at Eglin AFB in Florida. It is slated for installation in a high-speed fighter and in reconnaissance, bomber and cargo aircraft.

The ASN-7 automatically and continuously shows a pilot his present position, distance to his destination and the course he should fly, regardless of how his flight path changes.

The robot navigator has commercial as well as military applications. It weighs about 65 pounds and occupies about 1.1 cubic feet.

Present position accuracy, say Ford Instrument officials, is required to be at least 1.5% of total distance traveled and six miles on course and distance.

The system was produced under a $15-million Air Force contract.

ASN-7 can operate in conjunction with Doppler radar. With the radar, system accuracy is increased further according to the company.

SOLENOID VALVES

By
M.C. MFG. CO.

MC 2644-1 VALVE—SHUT OFF
SOLENOID OPERATED
meeting the following aircraft
specifications:
FLUID: Air or Nitrogen
PRESSURE RANGE: 0 to 1500 psi
TEMPERATURE RANGE: —65°F to
+160°F
FLOW FACTOR: Fs=.05
INTERNAL LEAKAGE: 10 cc/min.
Max. at 18 to 30 volt DC, 200 to
1500 psi inlet pressure
EXTERNAL LEAKAGE: Zero
SOLENOID: Continuous duty
Voltage range 18 to 30 volt DC
1.5 amps max. at 27 volt DC
PORT CONNECTIONS: Per AND
10050
WEIGHT: .9 lbs.
MILITARY SPECIFICATION: Appli-
cable paragraphs of MIL-P-5518
and MIL-P-8564

Hydraulic and Pneumatic
Components for the
Aircraft Industry

VALVES OF ALL TYPES: Relief
Solenoid • Manual Control
Transfer • Shuttle • Brake • Con-
trol • Fluid • Pressure Reducing
Restrictor and Special

ALSO: Air Compressors • Fuel Pumps
Dehydrators

M.C. MANUFACTURING CO.
118 INDIANWOOD ROAD
LAKE ORION, MICHIGAN

West Coast Office: 716 Wilshire Blvd.
Santa Monica, Calif.

Representatives:
D. & O. ENGINEERING CO.
P.O. Box 3107, Wichita, Kansas

F. C. MINCH
1132 Donson Drive, Dayton 10, Ohio

Circle No. 27 on Reader Service Card.

ments before the next tests, he said.

Others feel progress cannot be made without a set of tests to provide statistical and confirming evidence of faults. Many had their worst problem when they tried to reproduce results and so wanted to emphasize catering to fabrication and assembly problems from the beginning. Some wanted to permit substantial redesign.

Out of all these points of view, Schriever said, a test philosophy was adopted which "carefully considered the transition to production and the attainment of reliability."

Ground testing of components continues but is not allowed to hold up air tests and flights have been taken with the known possibility of failures, Schriever said. Guided missile flights cover only minutes, while hundreds of flights are needed for an hour of reliability tests.

Some tests ignored by press

And, he added, flight tests always receive most press attention but other test programs going on elsewhere are ignored.

For example, one test program used Lockheed's reentry test vehicle, the X-17, to carry small-scale versions of development ICBM nose cones. This program has been successfully completed after 20 flights at Mach 14.

Results show that theoretical calculations made have been confirmed as correct. A few X-17 flights gave trouble, Schriever said, but 90% were successful. The result is that nose cone work has moved from the R&D to engineering stage where reliability of components in the nose cone must be improved for an operational vehicle.

This part of the program is "near the end of the line," Schriever said, and when we have succeeded we'll have an operational vehicle. He refused to comment on the target date.

Explaining the reason for AF work on both the Atlas and Titan ICBMs, Schriever said both are aimed to perform the same objective but the technical approach in each is quite different. They are competitive technically and industry-wise.

Schriever said that since recent money cuts are related to the retreat from masses of weapons it appears that the electronics industry will suffer. Although the market for large numbers of aircraft types of electronic equipment might be sharply reduced, the need for better and more sophisticated devices will partially compensate for reductions in numbers.

He advised organizations interested in serving the military to "keep one foot firmly planted in the technology already established, but be prepared with the other to step into the imaginative and challenging missile electronic field."

Sound planning and diversification with a policy of exploiting present techniques, but exploring advanced and fundamental approaches seems necessary now, Schriever said.

He gave some advice on specific areas of electronics which his staff says are worthy of attention for future AF applications. These are:

Solid state devices, particularly in regard to quality control and reliability.

More accurate instrumentation for missiles.

Improved packaging for high static and vibration environment.

Light-weight electronics associated with gyros and inertial systems.

Work on data "extraction" devices to convert information from analog to digital form.

Schriever said "the world would probably beat a path to the door of someone who built a truly really outstanding accelerometer," and "most particularly if he could do it for a reasonable price."

AMERICAN AVIATION learned that Gulton Industries, Inc. recently sold Convair $1.6 million worth of accelerometer systems for the Atlas project. The devices can fit in the palm of the hand, cost $900 each and have wide sensitivity from ½ to 100Gs in one unit. One estimator said such devices cost $5,000 to $10,000 per pound.

Asked by this writer at a press conference whether there was a basic difference between guidance philosophy in the Army and AF IRBM developments, Schriever said Jupiter, Thor and Atlas use inertial systems with a radio backup.

The difference is in components being used, he said, particularly in the gyro systems being used. Army uses air-bearing gyros made by Ford Instrument Co., division of Sperry-Rand Corp. and the AF uses floated gyros in its system built by AC Spark Plug division, General Motors Corp.

Radio, transponders would help

Radio in the hybrid systems would be used to correct the trajectories of missiles after firing. Transponders in the missiles will supply information to interrogating radars on the ground.

Large computers being built by Burroughs Corp. for the Atlas are designed to hold trajectory information prior to launching. After launching, data on course, speed and altitude are sent to computer from the missile.

The computer compares the missile data with previously programmed data and orders changes necessary to keep the missile on the predetermined course.

Asked about defense against the ICBM, Schriever said it was a very expensive and long-term proposition. "I'd much rather be in charge of a ballistic missile project than a program designed against it," he said.

He would not say we can't develop a defensive system against the ICBM, but warned that we must be careful from the very beginning about the money we put into it.

At this time, he said, we are only in the "study, research and experimental stage," on an anti-ICBM defense.

TINY TOWN OR MIGHTY METROPOLIS *Esso is there . . . at 600 airports from Maine to Texas!* Leave it to those Esso Aviation Dealers . . . to give your plane the knowing kind of service it needs to keep you right on schedule. With an Esso Aviation Credit Card (they're easy to apply for), you can charge almost anything—including gasoline, oil and lubrication (you can't beat those Esso Aviation products) and even tire and battery service, landing fees, overnight in-transit storage and minor emergency repairs. How's that for a good deal?

FREE TO PILOTS! For your free Esso Flight Calculator, handy guide in figuring True Course, Drift Angle and Ground Speed, be sure to see your nearest Esso Aviation Dealer.

Esso

AVQ-10

"WEATHER DETOUR AVOIDED— SAVED 30 MINUTES!"

Airline and business aircraft pilots agree that RCA's weather radar (AVQ-10) saves flying time, increases passenger comfort, eases pilot-tension, provides valuable ground-mapping information.

All these things are important to owners and operators of aircraft, too. That's why so many of them are specifying RCA weather radar.

Let us tell you more. Address inquiries to:

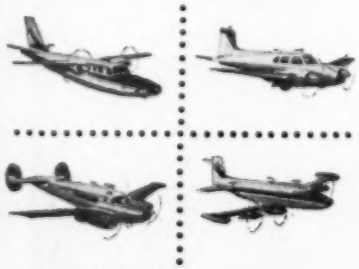
Custom Aviation Equipment

RADIO CORPORATION of AMERICA

11819 W. Olympic Blvd., Los Angeles, Cal.

Trak(s) ®

Now also for such airplanes as Aero Commander, Twin Bonanza, Beechcraft Super 18, Cessna 620



RCA's Weather Avoidance Radar (AVQ-50) is suggested for the above and other airplanes where weight, space and power are at a premium.

Circle No. 13 on Reader Service Card.

California air taxi service flies 60,000 passengers a year

by Richard van Osten

ONE OF THE BUSIEST air taxi operators in the nation is Avalon Air Transport, Long Beach, Calif., whose activities range from hauling 60,000 passengers a year across the Catalina Channel to flying salvage crews into remote Mexican coastal waters.

To celebrate the fourth anniversary of its service between the Southern California mainland and Catalina Island, approximately 21 miles off the coast, the company intends to put a four-engined Vought-Sikorsky VS-44A flying boat into operation in the next few weeks.

One of three such ships built for American Export Lines during the 1943-45 period, the VS-44A has been operating in South American waters, but has accumulated only 2,600 hours total time. Powered by four R1830-92 engines, the aircraft has an empty weight of 30,000 pounds and a gross of 60,000. Cruising speed will be approximately 185 mph with the 46 passengers it will carry after its conversion is completed.

Avalon Air Transport was started by Wilton R. Probert in August 1953 to provide a much-needed mainland-island air service. Prior to that time, he had operated a flying school at Pacoima, Calif., with film star Andy Devine. During the war he was an instrument check pilot with the Consairway Division of Consolidated-Vultee on Australia runs for the Air Force.

Beginning operations with one Grumman Goose, purchased from an Alaskan operator, AAT has built its fleet up to six "Geese" and seven pilots.

Long Beach is the main base of activity for AAT, but summertime passenger flights to the popular island resort also serve Burbank and Santa Monica, Calif. Peak travel to Catalina comes during June, July, August and the first two weeks of September when the air taxi service operates a flight every half-hour from Long Beach and equivalent flights from the other two terminals.

With one roundtrip completed approximately every 35 minutes in the nine-passenger Grummans, peak season travel accounts for 50% of the year's total of mainland-island hauls.

The company estimates that it has made more than 28,000 crossings of the Catalina Channel in its four years of operation.

Passenger travel has increased 20% during each year of operation, establishing a grand total of 60,000 for 1956. This figure is expected to reach about 66,000 for the 1957 season, but neither figure includes charter or special flights.

In the Fall of 1954, AAT was awarded a contract by the Naval Ordnance Testing Station in Pasadena, Calif., to carry certain personnel between the mainland and a testing facility on San Clemente Island. The Navy also uses the services of AAT in search operations, tracking down some of the equipment used in San Clemente tests.

The company also has a contract to carry civilian workers for a construction company engaged in work on one of the Channel Islands, picking up the crews each Monday, flying to the work site, and returning them to the mainland each Friday.

In July 1955, AAT was awarded a mail "air star route" by the Post-office Dept. to replace the steamship service which island residents consider too slow. The air taxi service now carries all classes of mail on a flat rate per day basis and is often the only source of mail service to the island in winter time.

Walter von Kleinschmidt, an officer of the AAT corporation, estimates that the air taxi carries about 300,000 pounds of mail per year.

The city of Avalon, Catalina, depends upon AAT for far more than a means of fast transportation for money-spending tourists. As with any resort area, the city is equipped with adequate facilities for most emergencies, but they are limited in scope.

Because of this situation, the relationship between AAT and the residents of Avalon is one of interdependency. For example, each of AAT's pilots is an officer of the Avalon Police Dept. and the air taxi is often called upon to carry prisoners back to larger penal facilities on the mainland.

When the main water supply pipe for Avalon broke wide open some time ago, the city was without any water supply. AAT flew a special run to the island carrying technicians and replacement parts.

The air taxi is frequently requested to fly emergency ambulance runs between Catalina and the mainland, and has developed special stretcher equipment. Other ambulance flights are often made between a ship off the coast and the mainland.

When AAT applied for a Civil Aeronautics Board exemption to operate the VS-44A flying boat because its gross weight exceeds that normally permitted for air taxi service, the city of Avalon proved its exceptional community relationship with the air service. A petition, requesting the exemption be granted, was signed by 872 of the less than 900 registered voters and permanent residents of Avalon!

The company bases its charter rates on 50¢ a mile for domestic hauls and 60¢ a mile for Mexican flights because of added costs in fuel and a lack of proper facilities in most areas into which they fly.

AAT does no night flying except in the event of an extreme emergency, but most of its pilots and the company itself have been cited for daytime rescues, more than 50 of which have been made in the past three years.

AAT performs all its own maintenance tasks with the exception of engine, propeller and instrument overhaul. The nine-place conversions of the Grummans were also designed and manufactured by the company.

RARE VOUGHT-SIKORSKY VS-44A flying boat, purchased by Avalon Air Transport for Catalina Island air taxi service, arrives in Long Beach, Calif., harbor. Aircraft, which has 124-foot wing span, was bought from South American operator.

Colorful

Comfortable

Get Kraeuter's All New "CG" Pliers

in red, blue, green, yellow & orange

KRAEUTER has done it again. Now for the first time you can secure comfort and color along with KRAEUTER quality at no increase in cost.

Every KRAEUTER solid joint plier has a cushion grip of thick vinyl to make your tough jobs easy. All KRAEUTER "CG"* cushion grips provide easy identification—easy to locate in your tool box—ideal for departmental color coding in your plant. All KRAEUTER "CG"* cushion grip pliers assure you comfort and ease on the job.

Whether you use side cutters, diagonals, lineman's or one of the other quality pliers in KRAEUTER's long line, you will find "CG"* cushion grips a standard feature at regular prices.

Ask your distributor for KRAEUTER "CG's"* today and put ease in your work.

*CG Cushion Gripped Pliers

BUY THE FINEST
BUY KRAEUTER
BUY AMERICAN

AS MODERN AS TOMORROW

kraeuter & co., inc

FOR 100 YEARS THE FINEST IN HAND TOOLS 1850-1950 NEWARK, N. J.

Circle No. 29 on Reader Service Card.

BUSINESS FLYING

Civil aviation booming CAA figures show; 64,688 active aircraft registered

Civil aviation is experiencing its greatest boom since the years immediately following World War II, with the number of active civil aircraft having attained an all-time high of 64,688—4,256 more planes in 1957 than in the same period in 1956. Active registrations represented a ratio of 74% of the total registrations.

According to a CAA statistical analysis of U.S. civil aircraft, 87,531 aircraft were registered up to the beginning of the year—an increase of 2,211 planes more than last year's registration. The number of inactive planes dropped by 2,045, making a low of 22,843. Of the 64,688 active planes registered, 58% were manufactured prior to 1948.

Civil aircraft production has climbed rapidly, with some 7,205 aircraft built during 1956, as against 4,820 total production in 1955. Civil aircraft exports amounted to 1,707 planes, with 1,118 of these being new types.

Piper Aircraft Corp. and Cessna Aircraft Co. are responsible for 45% of the total active planes. Piper headed the list with 15,731 (24%) and Cessna accounted for 13,734 (21%).

Transport aircraft showed an increase of 16% during 1956 with a total of 1,735 active, compared to 1,497 registered as of January 1, 1956. The number of four-engine transports increased to 861 from the previous year's high of 702, marking the first time four-engine planes have outnumbered twin-engine types. Up to the beginning of the year twins numbered 848 compared to the previous year's high of 774.

Douglas-built planes dominated the transport field, accounting for more than one-half of the total fleet. The DC-3 continued to be the most numerous of all transport models. There were 362 DC-3 active, one-fifth of all U.S. transports.

Five airlines claimed 49% of the transport total—American Airlines taking top place with 192. United, TWA, Pan American and Eastern followed in that order with 185, 171, 167 and 140 respectively. These represent 70% of the total aircraft operated by these five airlines, and 69% of all four-engine types in operation.

Although it is 11 years since the first commercial helicopter was certified, the last registration count showed only 302 active. Of this total, 282 were produced by three manufacturers—Bell, Sikorsky and Hiller. Bell accounted for over two-thirds of the total, while Sikorsky built 17% and Hiller 9%.

This in no way reflects the number actually built, since by far the largest number were produced for the military services, which accounted for approximately four-fifths of the total production during 1956. The second influencing factor is that in the civil field, more than half of the civil type helicopters have been exported.

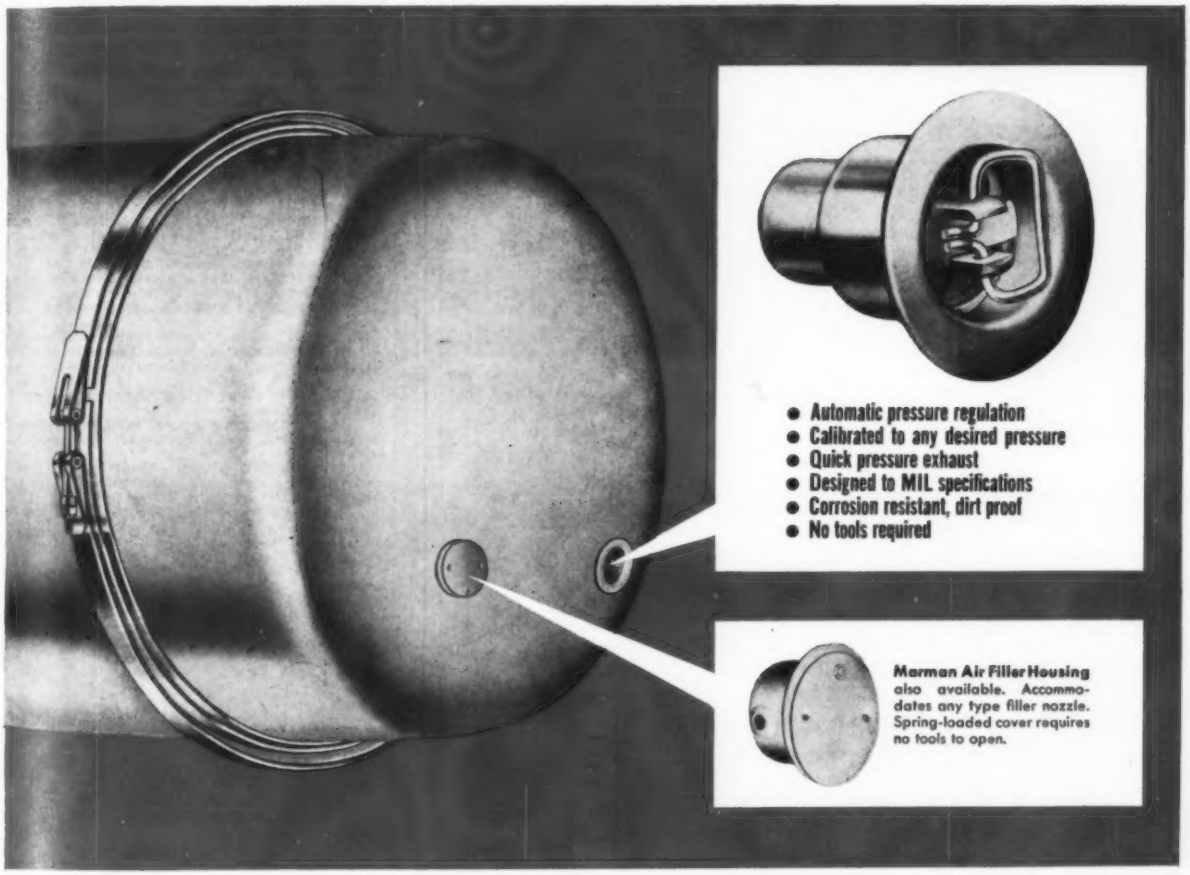
U.S. civil helicopters registered January 1, 1957

Manufacturer	Active	Inactive	Total
Bell	203	23	226
Sikorsky	51	22	73
Hiller	28	23	51
DeLackner	8	..	8
All Others	12	43	55
TOTAL	302	111	413

U.S. civil aircraft registered January 1, 1957

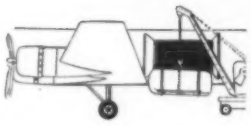
Manufacturer	Active	Inactive	Total
Piper	15,731	5,204	20,935
Cessna	13,734	2,249	15,983
Beech	5,045	668	5,713
Convair (Includes Stinson)	4,137	2,051	6,188
Champion (Includes Model 7 series built by Aeronca)	3,873	1,364	5,237
Massey (Includes Model 8 series built by Luscombe)	2,829	929	3,758
Taylorcraft	2,827	1,839	4,666
Forney (Includes ERCO Model, 415 Series)	2,664	776	3,440
Aeronca	2,240	1,402	3,642
Boeing (Includes Stearman)	2,193	1,138	3,331
Ryan (Includes Navions built by North American)	1,495	380	1,875
Douglas	1,342	167	1,509
TEMCO (Includes Swifts built by Globe)	891	288	1,179
Fairchild	698	1,088	1,786
Lockheed	523	103	626
All Others	4,466	3,197	7,663
TOTAL	64,688	22,843	87,531

New! MARMAN Pressure Control Valve Simplifies Charging of Shipping Containers



- Automatic pressure regulation
- Calibrated to any desired pressure
- Quick pressure exhaust
- Designed to MIL specifications
- Corrosion resistant, dirt proof
- No tools required

Marman Air Filler Housing also available. Accommodates any type filler nozzle. Spring-loaded cover requires no tools to open.



The new Marman Pressure Control Valve simplifies pressure regulation and relief in large sealed containers used for storing and shipping military and commercial equipment. Filtered and dried air introduced into the container displaces existing atmosphere through the Marman valve. The valve is calibrated to maintain any desired pressure. Should greater pressure differential occur, the Marman valve relieves back to the maximum desired pressure.

For quick access to the container, the valve provides an air exhaust equivalent to a 1" pipe. Available in standard sizes, for pressures up to 20 psi. Write today for full information.

MARMAN DIVISION
Aeroquip Corporation

11214 EXPOSITION BLVD., LOS ANGELES, CALIFORNIA
IN CANADA: AEROQUIP (CANADA) LTD., TORONTO 10, ONTARIO
MARMAN PRODUCTS ARE MANUFACTURED UNDER VARIOUS U. S., CANADIAN AND FOREIGN PATENTS AND OTHER PATENTS PENDING

Circle No. 30 on Reader Service Card.

AERONAUTICAL ENGINEERS

SALARIES TO $15,000

A major West Coast aircraft organization is establishing an important department which will report directly to the Director of Engineering. Assignments will encompass efforts on military, commercial and research designs through subsonic, transonic and supersonic speed regimes. Openings include:

■ *A research specialist*, or higher classification, with the highest degree of competence in airplane performance estimation. A minimum of 10 years' experience is required.

■ *A research specialist*, or higher classification, who is expert in all phases of airplane stability, control and basic loads analyses and estimation. A minimum of 10 years' experience is required.

■ *An aeronautical engineer* with a minimum of five years' experience. He must be experienced in aerodynamic analyses and capable of organizing aerodynamic data for use in estimating airplane performance, stability and control.

Please send your resume to box 733, AMERICAN AVIATION Magazine, 1001 Vermont Ave., N. W. Washington 5, D. C.

CONTRACTS

Department of Commerce has announced the following contracts:

Marquardt Aircraft Co., $11,719,693, ramjet engines.

Goodyear Aircraft Corp., $1,109,864, incorporation of engineering changes and flight testing of guidance system.

Page Airways, Inc., $1,039,629, storage of government owned equipment.

Philco Corp., $1,808,914, maintenance of aircraft control and warning sites.

Aerodex, Inc., $1,160,850, overhaul of aircraft engines.

Radio Corporation of America, $1,272,289, maintenance of aircraft control and warning sites.

Lockheed Aircraft Services, Inc., $1,764, IRAN of RC-121 aircraft.

Douglas Aircraft Co., Inc., $1,782,055, IRAN of B-47 aircraft.

Wright Aeronautical Division, Curtiss-Wright Corp., $1,707,000, overhaul of J65 engines.

Air Materiel Command has announced contracts to three airlines for overseas air transport.

The Flying Tiger Line, $4,626,531, from Travis AFB.; Calif., to Tokyo and return.

World Airways, Inc., $1,107,069, between Tokyo, Okinawa, Formosa and Manila.

Seaboard & Western Airlines, Inc., $1,660,027, from Idlewild to Burtonwood, England, points in France and Germany and return.

A fourth contract for $2,300,000 was awarded to Transocean Air Lines, for airbase services, including messing and billeting.

Boeing Airplane Co., $22 million, implementation of fiscal 1958 B-52 model improvement program.

Hayes Aircraft Corp., $8,915,379, modification of B-50s to KB-50, IRAN and maintenance.

Consolidated Diesel Electric Corp., $4,812,040, engine-driven generator sets for starting and preflight of aircraft.

Texas Instruments, Inc., $1,394,318, radar sets.

Lockheed Aircraft Corp., $8,845,654, F-104B two-seater fighters.

Republic Aviation Corp., $10 million, F-105 test aircraft.

General Electric Co., $5,002,354, worldwide depot maintenance and supply in support of GE radar equipment.

Ingersoll-Rand Co., $1,668,825, compressors.

Hughes Aircraft Co., $2,923,696, IRAN for Falcon missiles.

Air Mod Corp., $3 million, maintenance of MATS aircraft; $2,632,144, reconditioning and modification of C-124 aircraft.

Hayes Aircraft Corp., $2,061,544, IRAN of C-119 aircraft.

Aircraft Engineering Maintenance Co., $2,558,124, IRAN of T-33 aircraft.

Flight Enterprises, Inc., $2,395,332, reconditioning and modification of C-118 aircraft.

FACILITIES

Fischer & Porter Co. has moved its Houston operations to a recently completed building which will house sales offices, display area and warehouse and shop areas.

Techniques, Inc., has acquired additional space for sample and short-run production of etched circuits. Headquarters is at Hackensack, N. J.

Hamilton Standard Div. of United Aircraft Corp. has moved machinery and equipment into a new 410,000-sq.-ft. plant at Windsor Locks, Conn. Full-scale operation of the facility is slated for October.

Bristol Co. has moved its Newark, N. J., sales and service staff into enlarged quarters. R. C. Bechert is branch manager.

Minneapolis-Honeywell Regulator Co. has opened its $1.5-million plant at Fort Washington, Pa., for production of industrial valves.

Bernco Engineering Corp. has purchased the Electric Switch Corp. of Columbus, Ind.

Construction has begun on a fourth 51,000-sq.-ft. laboratory at Lockheed Missile Systems Division at Sunnyvale, Calif.

The Calidyne Co. has broken ground for a 46,000-sq.-ft. plant at a 12-acre site in Woburn, Mass. Completion is slated for early 1958.

Convair-Astronautics is moving into its $40-million Atlas plant at San Diego. Complete occupation is slated for January. More than 7,000 persons will be employed at new facility.

How DC-6A was salvaged from 'inaccessible' mud flat

Just two months and a day after its crew pancaked a Flying Tiger Line DC-6A onto a mud flat on Jamaica Bay, Long Island, the plane was taxied out of Lockheed Aircraft Service-International hangar at Idlewild ready for flight.

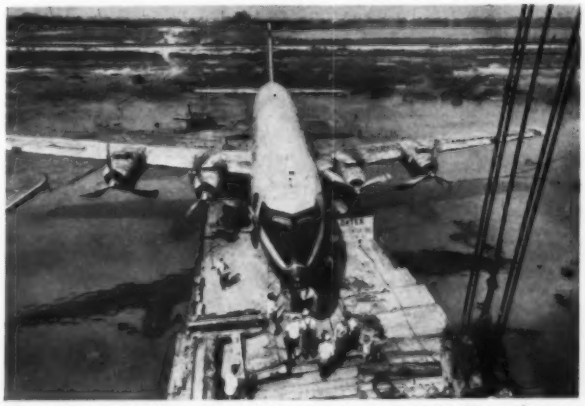
An LASI crew went to work within an hour after the wheels-up landing, jacked up the aircraft to keep it above the water level. At high tide, the level reached 30 inches up on the fuselage.

Biggest problem was how to move the plane off the mud flat back to Idlewild. On the right side were subway tracks, on the left was the bay.

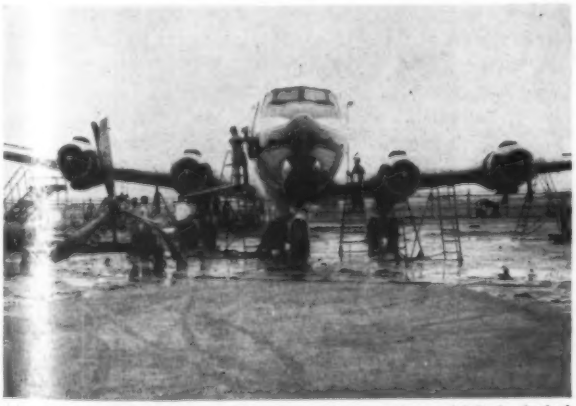
A salvage firm, Gates Brothers, finally dredged a channel to the plane, floated it onto a barge. One month after the emergency landing, the DC-6A arrived at LASI, where major repairs included changing the four engines, removal and replacement of a major portion of the belly skin, repair of nacelles, wing flaps and main gear.

DC-6A all-cargo plane lies on mud flat after wheels-up landing near Idlewild International Airport June 21. Special crew from LASI is on hand to start salvage operations.

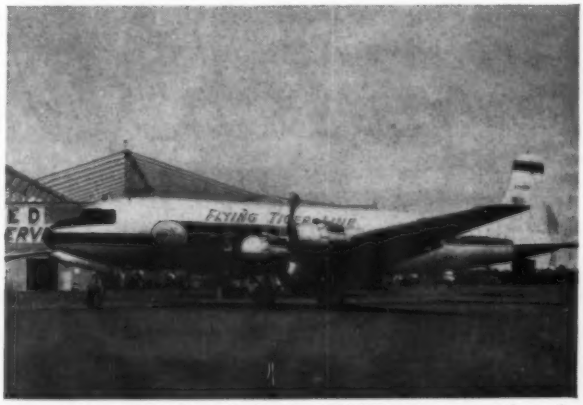
Aircraft is jacked up to get it out of high-tide water. A special coating was applied to prevent corrosion.



Salvage crew built a special channel to permit loading of cargo plane onto a barge for trip back to Idlewild.



Aircraft is washed down prior to major repairs, which included replacing engines, major part of belly skin.



August 22: aircraft is rolled out at LASI, engines revved up for taxi tests, first flight before return to FTL.

COMING OCTOBER 21...

The most important single issue of any aviation magazine...with the heaviest reader-traffic of the industry...

AMERICAN AVIATION "ENGINEERS HANDBOOK" ISSUE

A complete, timely report on new products, new materials, new equipment in all phases of the aviation industry. Ten big sections of complete new product and equipment information, including manufacturers' names and addresses. Plus important editorial features.

Month after month you pursue the buyer in your advertising, trying to get him to listen to your product story. Now, all at once he's looking for you, ready and eager to hear what you have to say. This is your big chance to reach him in his most receptive mood.

Busy engineers throughout the many-sided aviation field will keep this one issue at hand all year, use it as a standard reference index whenever they're looking for new products, equipment, materials to meet new specifications, adapt to new uses. The aviation industry is dynamic and changing, always on the lookout for new products and materials to solve tomorrow's problems. The "Engineers Handbook" issue will deliver heavy reader traffic for the next 12 months.

Circulation for this issue—60,000 . . . to be directed to engineers and management in all critical industry functions.

HIGH IMPACT EDITORIAL FEATURES

Editorial features will tie in closely with the engineering theme . . . case studies of manufacturers procurement policies, service techniques. These full-scale analyses of ever-present industry problems will guarantee high reader interest.

TEN BIG DIRECTORIES IN ONE

Directory listings will be separated for reader convenience into ten sections—each arranged by product type with alphabetical listing of components for quick reference.

Advertisements will be placed as close to the specific product listing as make-up will allow. When an engineer looks for your type of product, he's sure to see your ad.

Whatever your product, there's a special section here for you.

1. AIRCRAFT ACCESSORIES . . . fuel, oil, hydraulic, pneumatic, fire extinguishing and detection, oxygen, pressurization, etc.

2. ENGINE ACCESSORIES . . . fuel, oil, water injection, starters, magnetos, fuel control, injection systems.

3. INSTRUMENTS . . . all aircraft and engine instruments and related accessories.

4. ELECTRONIC EQUIPMENT . . . all airborne transmitters, receivers, power supplies, antenna equipment, cockpit instrumentation and controls, all devices related to communication, navigation and radar equipment.

5. ELECTRICAL/ELECTRO-MECHANICAL . . . generators, voltage regulators, power supplies, circuit breakers, all electro-mechanical devices.

6. AIRCRAFT FURNISHINGS . . . seats, foot rests, ash trays, galley and food service supplies, signs and placards, etc.

7. GROUND SUPPORT EQUIPMENT . . . starters, ground power supplies, oil and fuel servicing equipment, tractors, service carts, etc.

8. TOOLS AND MAINTENANCE EQUIPMENT . . . special tools, work stands, test equipment, cleaning devices and compounds, etc.

9. MATERIALS . . . metals, plastics, insulating and acoustical materials, laminates, windows, etc.

10. HARDWARE . . . bearings, nuts, bolts, fasteners, tubing and wiring clamps, control cables and turnbuckles, gaskets, seals, etc.

Wherever illustrations or photos are necessary to present the product editorially, they will be included. Many new products appearing here for the first time will be given feature presentation. All this adds up to high reader interest, effective advertising opportunity. Don't miss it. Reserve enough space to tell your full product story, give all the details the buyer will need before your salesman calls.

"ENGINEERS HANDBOOK" ISSUE

Coming October 21 . . .

Closing for advertisers September 30

For further information
contact your nearest regional advertising manager.
New York — 17 East 48th Street — PLaza 3-1100
Cleveland — 1422 Euclid Avenue — PRospect 1-2420
Detroit — 201 Stephenson Bldg. — TRinity 5-2555
Chicago — 139 N. Clark Street — CEntral 6-5804
Los Angeles — 8943 Wilshire Blvd. — CRestview 6-6605
Miami — International City, 4471 N.W. 36th Street
Toronto — 12 Richmond Street East — EMpire 4-2001
Montreal — 1487 Mountain Street — HArbour 6898
Executive Offices: 1001 Vermont Ave., N.W., Washington 5, D.C.
STerling 3-5400

AMERICAN AVIATION

World's Largest Aviation Publishers

ALLISON POWERS

Navy's giant aerial tanker

–THE CONVAIR R3Y TRADEWIND

With its Allison T40 Prop-Jet engines and contrarotating Aeroproducts turbo-propellers, the R3Y represents a new concept in powered flight. Twin power sections in each engine provide a total of nearly 24,000 horsepower. One power section in each engine can be shut down for maximum fuel economy at cruising speed.

The result: the new Air Navy has the world's largest water-based aircraft. It is capable of refueling eight jets in flight—four at a time in less than 5 minutes—or landing 103 combat troops on any beach in the world. Another example of how Allison provides the exact power for any airframe requirement.

Jet-age experience is a matter of record at Allison—America's pioneer producer of aircraft turbine engines.

ALLISON DIVISION OF GENERAL MOTORS, Indianapolis, Indiana

ALLISON *Prop-Jets and Turbo-Jets*

GM AIRCRAFT POWER

Dominican Republic is expensive place to land

by Anthony Vandyk

THE QUESTIONABLE HONOR of having the world's highest landing charges goes to the Dominican Republic. This is disclosed in the latest edition of the International Civil Aviation Organization's Manual of Airport and Air Navigation Facility Tariffs (price: $2.50). The publication shows that the daytime landing charge for a Douglas DC-6 on a scheduled international flight amounts to $150.50 in the Dominican Republic.

Other countries that charge more than $100 per landing for a DC-6 include Brazil, $137.07; Canada, $133.77 (for the last takeoff or first landing at a Canadian airport on a transoceanic flight); Haiti, $105.35; Surinam, $146.73; New Zealand, $113.40, and Fiji, $139.28.

At the other end of the scale, Honolulu takes top honors in having low landing charges—a DC-6 pays only $2 there. Other countries which have unusually low landing charges include Chile ($11.52); Iran ($11.24); Mexico ($5.12); Nicaragua ($6); Spain ($10.96); and Uruguay ($7.14).

All the above charges are for daytime landings. Sometimes there is a substantial increase for use of airports at night. For example, in Uruguay, the $7.14 daytime charge goes up to $42.85 by night. In Spain the rate doubles for night landings. Generally, the tendency is for little change in charges for night landings where the day rate is high. For example, in the Dominican Republic, the rate is $155.50 by night against $150.50 by day.

The ICAO manual shows that in the U.S. airport charges are generally extremely moderate and there is no difference between day and night charges. Highest rate (still for DC-6) is at New York's International Airport (Idlewild) where the charge of $72.15 includes porter service, incinerator service and inspection space. At Newark and La Guardia it is $18.64. The charge at Boston is $15.95; Miami, $48.50, and San Francisco, $14.45. The lack of consistency of charges in the U.S. is duplicated in most other continents. Only in Australia is there a standard charge (day or night) of $73.70 (again for DC-6 aircraft on scheduled international flights).

Russians to launch jet service to Denmark

The first scheduled service by Tu-104 to a Western nation's airport is due to start on December 1. The nation is Denmark. Aeroflot plans to introduce the jet equipment on the Moscow-Copenhagen route at the beginning of December, linking the two capitals in two hours, provided that runway extension work at Copenhagen's Kastrup airport is completed by then.

There will be a weekly Tu-104 flight, later twice weekly flights. Aeroflot's service between Moscow and Copenhagen is now operated with I1-12 or I1-14 piston-engine aircraft, which make an intermediate stop at Riga.

Agricultural plane industry booming in Australia

Big expansion moves involving the establishment of new companies and introduction of larger aircraft are under way in the Australian air agriculture industry. Super-Spread Pty. Ltd., of Moorabbin, Victoria, has merged with the New Zealand stock and station agents, Wright Stephenson & Co. Ltd., and has added three Percival EP9 aircraft to its fleet of 28 Tiger Moths.

An American pilot, John Neace, has revealed in Sydney that he has been granted import licenses for five Stearman agricultural biplanes, three of which have already been shipped. He hopes to establish an Australian subsidary of the U.S. firm, Crop Care, and to assist the industry in Australia by launching a school for aerial applicator pilots.

Aerial Agriculture Pty. Ltd., which now operates 14 Tiger Moths, recently purchased a Bristol 170 Freighter and is awaiting delivery of a De Havilland Beaver with a payload of 2,200 lbs., and six Czechoslovakian Brigadyrs capable of lifting 1,200 lbs. each. A 6-ton superphosphate hopper is now being installed in the Bristol Freighter.

Engine Lives Increase

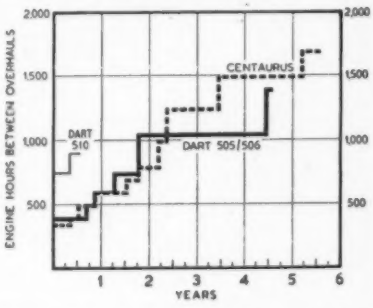


CHART SHOWS rapid rise in overhaul life (from date of first delivery) of two types of engines used by British European Airways: Bristol Centaurus (used in Elizabethan), now 1,700 hours, and Rolls-Royce Dart, now 1,400 hours.

BRIEFS

Lufthansa German Airlines plans to introduce L-1649A equipment on the North Atlantic in December. Four of the Lockheed transports are to be operated by Lufthansa under the name of Super Star. The airline will start service to Copenhagen under its fall schedules . . . **Iberia** has introduced a call at Lisbon on one of its four weekly Madrid-New York flights. The Spanish airline will substitute Super Constellations for DC-4s on its Madrid-South America service effective October 7 . . . **British European Airways** and Czechoslovakia's **CSA** plan to reopen the London-Prague route, suspended for several years, in the fall.

VARIG has cut its Brazil-New York service to twice weekly as the result of the loss of one of its three Super Constellations . . . **Loide Aereo,** Brazilian airline, has received its four-engine transport, a DC-4, as part of its modernization program which includes the purchase of four DC-6s for delivery starting next summer.

The first of 10 Viscounts ordered by **Indian Airlines Corp.** has been delivered. The Viscount fleet will be used on regional and domestic services. Starting in mid-October the following Viscount routes will be developed: Delhi-Calcutta, Calcutta-Rangoon, Bombay-Delhi and Bombay-Karachi. During 1958 the Viscount network will be extended to cover Bombay-Calcutta, Delhi-Hyderabad, Hyderabad-Bangalore, Bangalore-Madras, Madras-Calcutta and Bombay-Madras-Tiruchirappalli-Colombo.

The Dominican Republic is reported to have placed orders with Japan's **Shin-Mitsubishi Heavy Industries Co., Ltd.,** for 25 F-86F jet fighters . . . Britain's Air Ministry states that total redundancy of personnel during run-down to meet the manned aircraft-to-missiles switch is unlikely to exceed 1,700 men; 700 officers, 1,000 other ranks. Contraction is slated for completion by October 1958 and schedules of personnel who can apply for premature release have been given. As an example group captains (equivalent to full colonel) now 47 years or older will be axed.

Trouble wasn't spelled that night

. . . THANKS TO ALL-STEEL DURABILITY!

When someone inadvertently turned off the cooling system, it surely spelled trouble for this Jet Test Cell Silencer! It glowed *cherry red* (approx. 1500°F) and lit up the area like a christmas tree! But, although mufflers made with fibrous materials would have been *totally destroyed*, inspection the next morning showed that the DURA-STACK was *totally unharmed*, proving that –

the **DURA-STACK**

All-Steel Jet Engine Silencing System is the only system devised to take the high temperatures and velocities of modern jet and rocket engines!

Acoustically, IAC DURA-STACK performance is designed specifically for the jet engine noise spectrum. With a nearly flat response, it is no longer necessary to buy unrequired amounts of attenuation to obtain the low frequency noise reduction needed for good community relations.

Full Details Will Be Furnished Upon Request

Aviation Division

INDUSTRIAL ACOUSTICS COMPANY, INC.

341 Jackson Avenue, New York 54, N. Y. Tel: CYpress 2-0180

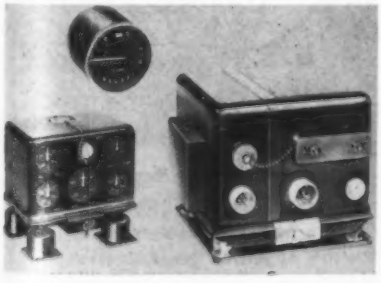
NEW PRODUCTS

Lightweight loop antenna

THE MAGNAVOX CO. has designed a lightweight loop antenna for ADF use. Frequency range is 190 to 1760 kc. Weight is 7.5 lbs.

Space required for the unit is about 35% of previous requirements. Housing design is such that the housing extends 2½″ from the aircraft skin.

Circle No. 126 on Reader Service Card.

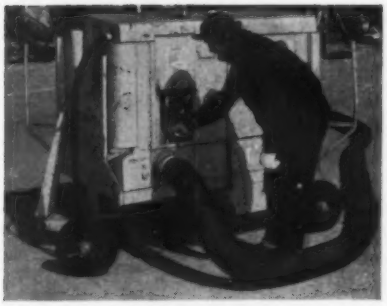


Engine-temperature recorder

AVIEN, INC., has developed an over-temperature recorder for jet engines designed to aid in resolving the conflicting requirements of maximum engine efficiency and flight safety.

The instrument monitors any single, group or range of engine temperatures against permissible duration time specified by the engine manufacturer. Duration of any monitored temperature beyond the specified safe interval is indicated on a timer-recorder providing a positive log of engine-operating temperatures, and eliminating pilot opinion from evaluation of engine serviceability.

Circle No. 129 on Reader Service Card.



Electric heater

COATES ELECTRIC MANUFACTURING CO. has designed an electric heater for flight-line heating of the Boeing B-52 and similar airplanes.

The heater is an all-purpose ground-support unit especially suitable for warming nacelle areas or the interior of the plane during cold weather when it is not practical to use the aircraft's heating system.

Heater was built to operate safely under all conditions including environments in which flammable volatiles or liquids are present. Heat output is 75,000 BTU/hr at 40°F inlet ambient air temperature and at 500 cfm air flow. Air-drive fan delivers 600 cfm against 7½″ wg pressure at the unit discharge. Operates at temperatures to —30°F in wind, rain and snow. Measures 64″ x 81″ x 52″.

Unit can be towed at 20 mph, has 100-ft. flexible power cable. It can be used for cooling by changing selector switch setting.

Circle No. 125 on Reader Service Card.

Pushbutton switch

MICRO SWITCH DIV. OF MINNEAPOLIS-HONEYWELL REGULATOR CO. is offering its Model 52PB51-T2 space-saving lighted pushbutton switch for aircraft applications.

Adaptable to both horizontal and vertical positions, it requires 2 1/8″ below its mounting panel. Indicator lamp socket is fastened to the outer body and does not move when the button is pushed. Terminals of the light are separate from the switch, allowing operation on a variety of circuits.

Power of the two switches are listed at 5 amps 125 or 250v ac. The 30v dc rating is: inductive, 3 amps at sea level and 2.5 amps at 50,000 ft.; resistive, 4 amps at sea level and 50,000 ft. Maximum inrush rating (ac) is 15 amps, 125 or 250v.

Circle No. 128 on Reader Service Card.

Water injection pump

Lear-Romec Division of LEAR, INC., is marketing a high-capacity water injection pump for gas turbine engines.

Model RR11610 is rated at 180 gpm at 35 psi gauge minimum discharge pressure. Motor requirements are 7 hp, 200 vac, 400 cycle, 3 phase, with current drain of 20 amp. nominal at rated flow and pressure. Rating is based on pumping tap water at temperatures from 40° to 120°F in ambient altitudes up to 8,000 ft.

Circle No. 127 on Reader Service Card.

TV monitors

GENERAL PRECISION LABORATORIES, INC. has developed a new line of video monitors for industrial TV use. Horizontal resolution is over 600 lines per inch and video bandwidth is flat to 8 mc±2db. Models with 14″, 17″, and 21″ tubes have 70° deflection, while models with 24″ and 27″ tubes have 90° deflection. Units are designed for continuous duty.

Circle No. 130 on Reader Service Card.

INCREASED FACILITIES FOR AIRLINES

Modern-day airline companies increase their maintenance and overhaul facilities by using Air Associates as their stock room for frequently needed parts and accessories. Only a few air miles away from main airline centers, Air Associates serves to streamline operations...helps meet tight schedules for greater airliner utilization.

More and more airline purchasing agents are relying on Air Associates in-stock service for on-schedule deliveries. Here is only a partial listing of Air Associates-distributed quality products:

Tinnerman speed nuts
Strateflex hose and hose assemblies
Kilgore flares
Scott oxygen equipment
Grimes rotating lights and fixtures
Reading batteries
Micro switches
Wickwire control cables
Air Associates new M-7500 seat belts
Goodyear tires, wheels, brakes
BG and Champion spark plugs
GE light bulbs
Complete stocks of AN hardware

AIR ASSOCIATES
Div. of Electronic Communications, Inc.
66 INDUSTRIAL AVE., TETERBORO, N.J.
BRANCHES: ATLANTA, CHICAGO, DALLAS, GLENDALE, MIAMI, SAN FRANCISCO, TETERBORO

Circle No. 32 on Reader Service Card.

Fractional horsepower motors

ROBBINS & MYERS, Inc. is marketing a line of Model R re-rated fractional horsepower motors.

They are available in ratings from 1/8 hp to 1 hp in polyphase, capacitor single-phase, permanent split-capacitor

and (in smaller ranges) split-phase types.

Available with either sleeve or fully sealed ball bearings and rigid, welded base or vibrationless, resilient mountings.

Circle No. 131 on Reader Service Card.

Linear accelerometer

PHYSICAL MEASUREMENTS CORP. is producing a viscous-damped, high-output, low-null-voltage (ac) linear accelerometer designed for high performance and rugged environments.

Null voltages less than 10 millivolts are standard while outputs up to 12 volts can be obtained. Damping is held relatively constant over the MIL temperature range without heaters.

Circle No. 132 on Reader Service Card.

Transistorized ac-dc converter

ELECTRO INSTRUMENTS, INC. is making an ac-dc converter module which converts average ac signals to dc with .1% accuracy. When combined with E-I universal power module and dc switch module, input data is automatically digitized.

Measurements are presented on 1" high edge-lighted numerals contained in the face panel of the switch module.

Accuracy .1% or reading or 2 mv; frequency response 30-10,000 cycles; range .0001-999.9 v; size 3½"x19"x12".

Circle No. 133 on Reader Service Card.

Ground power generators

MOTOR GENERATOR CORP. has developed two models designed specifically for use with Vickers Viscount 700 and 800 series.

Model 3040 is gasoline-powered and self-propelled. Model 3039 is a stationary unit with same electrical characteristics.

Continuous rating at generator terminals is 33kw (1,000 amps at 33 v), with a peak overload rating of

AVIATION
HEADQUARTERS
FOR
SOUTHERN CALIFORNIA
HOLLYWOOD PROFESSIONAL BUILDING

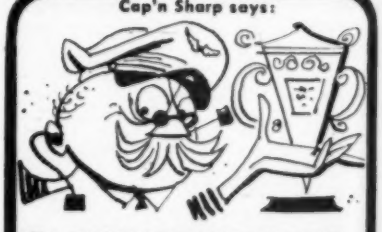
Ideally located for the Aviation industry, near the Freeways and adjoining the Hollywood Roosevelt Hotel and its new Million-Dollar Garage.

Selected by many Aviation Industry leaders for West Coast Headquarters.

You, too, will like the convenience and comfort of several excellent offices now available—at reasonable cost.

Hollywood Professional Building
"Aviation Headquarters"
7046 Hollywood Boulevard
Los Angeles 28, California
Phone: HOllywood 4-2173

Cap'n Sharp says:



"A WINNER WITH THE PROS FOR 23 YEARS!"

Jeppesen's Airway Manual

- only complete IFR flight manual
- frequently revised—widely used
- 11 different geographic coverages

Charts:
Jepco avigation (enroute), instrument approach, planning, terminal area, center frequency, weather radar, and others.

Flight Info:
preferential routes, cross-indexed CAA facilities, GCA and DF facilities, OMNI check points, Airway Traffic Control, CAR's 42, 43 and 60; Air Safety Bulletins, PLUS many other features.

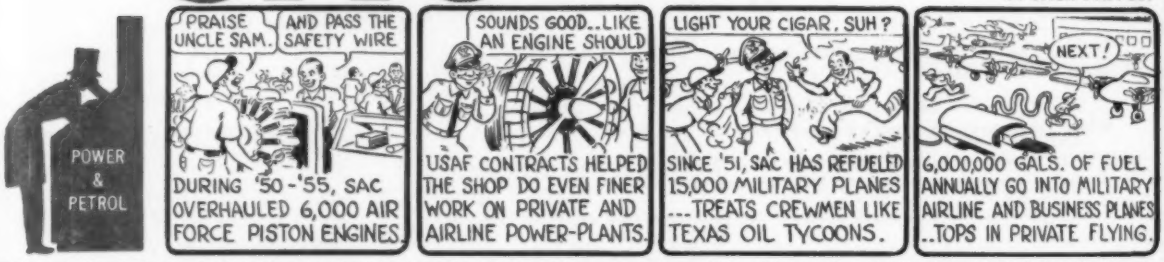
Write for folder 1V

Jeppesen & co.
• Flight Case • Air Route Guide
• Computer • Airway Manual
STAPLETON AIRFIELD, DENVER 7, COLORADO

Circle No. 33 on Reader Service Card.

SAC Silver Jubilee Newsreel

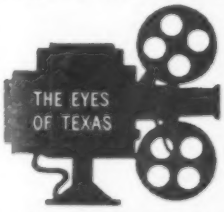
BY JACK PATTON


POWER & PETROL
PRAISE UNCLE SAM. AND PASS THE SAFETY WIRE
DURING '50-'55, SAC OVERHAULED 6,000 AIR FORCE PISTON ENGINES.
SOUNDS GOOD..LIKE AN ENGINE SHOULD
USAF CONTRACTS HELPED THE SHOP DO EVEN FINER WORK ON PRIVATE AND AIRLINE POWER-PLANTS.
LIGHT YOUR CIGAR, SUH?
SINCE '51, SAC HAS REFUELED 15,000 MILITARY PLANES ...TREATS CREWMEN LIKE TEXAS OIL TYCOONS.
NEXT!
6,000,000 GALS. OF FUEL ANNUALLY GO INTO MILITARY AIRLINE AND BUSINESS PLANES ..TOPS IN PRIVATE FLYING.

AC, Aeroquip Corp., Bendix Products Div., B. F. Goodrich, Canadian Pratt & Whitney, Delco-Remy, Eclipse-Pioneer Div. (Bendix), General Logistics, Glidden Co.,

Folks are mighty welcome at Southwest Airmotive . . . whether in civvies or in uniform . . . for a cup of coffee . . . or a contract involving 6,000 engine overhauls. These cowhands had a special "Howdy" some years back for flyers from up Oregon-way.

Hamilton Standard, Lycoming, MacWhyte Cable Co., Miracle Power, Montrose Div. (Bendix), New York Air Brake, Pacific Div. (Bendix), Packard Electric,



In 25 years, SAC's physical lay-out has changed a lot, but the friendliness and the drama on its ramp, and in its shops, are pretty much the same. The re-ception posse for an F-80 pilot recently included 6 ecstatic Cub Scouts. For a pert blonde flyer, we brought out a real, live Texas Ranger, complete with the Lone Star flag.

Don't Miss SAC'S Silver Jubilee P&WA Engine Forum, Sept. 25th!

Pesco, Pioneer Central Div. (Bendix), Pratt & Whitney Aircraft, Red Bank Div. (Bendix), Scintilla Div. (Bendix), Utica Div. (Bendix), and Willard Batteries.

1932 —A QUARTER CENTURY OF LEADERSHIP— 1957

Southwest Airmotive Co.

LOVE FIELD DALLAS

DIVISIONS: KANSAS CITY, KANSAS / DENVER, COLORADO

Circle No. 34 on Reader Service Card.

HALF A CENTURY OF TOOLING EXPERIENCE

at YOUR service . . .

For nearly 50 years, SHORTS have been making airplanes—and the tools to build them.

In 1909 they became the first manufacturers of aircraft in the world when they received a production order from the Wright brothers.

In recent years they have tooled and produced, along with their own range of aircraft, COMETS, CANBERRAS and BRITANNIAS.

Production on this scale needs great skill, immense capacity, and fine equipment.

Shorts have—

- **a payroll of 9,000**
- **700 toolmakers**
- **200 production engineers**
- **2,000,000 sq. ft. of plant**
- **a vast range of modern machine tools**

This ability and capacity to handle Major Tooling Programs are at the service of the American aircraft industry. A team of engineers is ready to visit, on request, potential customers anywhere in the USA. They will offer DELIVERY ON TIME, and at competitive prices.

Please address inquiries to: The General Manager,

SHORT BROTHERS & HARLAND LIMITED
QUEEN'S ISLAND — BELFAST — NORTHERN IRELAND

SUPER
LaVezzi
SERVICE
LAVEZZI—Reliable source for high precision machine parts.
Small parts for instruments, missiles, rockets, aircraft components, and other fine units, with close tolerances and fine finishes which are usually considered difficult to produce can be manufactured by LaVezzi strictly according to your specifications. Our years of experience are at your disposal.
Send your drawings for quotation or write for brochure or further details.
Specialists in fine machine work since 1908.
LAVEZZI MACHINE WORKS
4635 WEST LAKE ST. CHICAGO 44, ILL.

Circle No. 35 on Reader Service Card.

50 kw for six 10-sec. peaks with 60-sec. interval between peaks. Units are powered by 125-hp engine, have standard battery ignition system with generator, coil and distributor, and are equipped with a pushbutton type electric self-starter.

Circle No. 134 on Reader Service Card.

Antenna loading unit

TRANSVAL ENGINEERING CORP. is supplying an automatic MHF antenna loading unit for aircraft operators preferring a fixed antenna instead of trailing wire types.

Unit selects proper loading for any of six preset frequencies. Model TLU-6 unit weighs 6 lbs. Either 14 or 28 volts may be used.

Circle No. 135 on Reader Service Card.

Waveguide pressure window

MICROWAVE ASSOCIATES, INC., has developed a high power flange-mounted waveguide pressure window for use in radars operating in the 35 kmc frequency range and which require pressure seals to prevent waveguide or magnetron RF breakdown.

Designated MA-1334, the window is said to handle peak powers of 40 kw at atmospheric pressure. Higher power levels can be used with this window by increasing the pressure within the RG-96/U waveguide. The window is mounted directly between UG-600/U choke flanges in the RG-96/U waveguide.

Circle No. 136 on Reader Service Card.

Modular potentiometers

TECHNOLOGY INSTRUMENT CORP., has developed a line of subminiature, miniature and standard class potentiometers, featuring modular design, high-temperature operation and close linearity.

Typical of the line is the PVR-05. It is a subminiature precision potentiometer with an independent linearity of less than 0.25% of the total resistance. Operating range is from —55 to 145°C. The resistance range is from 50 to 100K ohms, with a 5% accuracy of total resistance and a 2 watt-power rating. Ball-bearing design provides a torque of less than .05 oz.-in. per section.

Circle No. 137 on Reader Service Card.

Avco today

Avco makes the "business end" of the ICBM

How to keep the intercontinental ballistic nose cone from blazing into white heat and vaporizing completely, as it re-enters the earth's lower atmosphere, has been one of the biggest problems facing missile developers. Avco Research and Advanced Development scientists have solved this problem in the laboratory. With a device called a "shock tube," they have simulated 18,000 mph speeds and 15,000 degree temperatures to study what happens to a missile during re-entry. They have produced re-entry information which has enabled Avco engineers to design and construct an experimental nose cone for the Air Force Titan missile. Another *breakthrough* by the Research and Advanced Development Division of Avco.

THIS IS AVCO

Avco today is a diversified organization whose products include aircraft power plants and structures, electronics for defense and industry, and specialized home and farm equipment. Avco's divisions and subsidiaries are:

Crosley—electronics and aircraft structures . . . American Kitchens . . . Lycoming—reciprocating engines and gas turbines . . . New Idea and Ezee Flow—specialized farm equipment . . . Research and Advanced Development . . . Crosley Broadcasting Corporation . . . Moffats, Ltd. (Canada)—commercial gas and heating equipment.

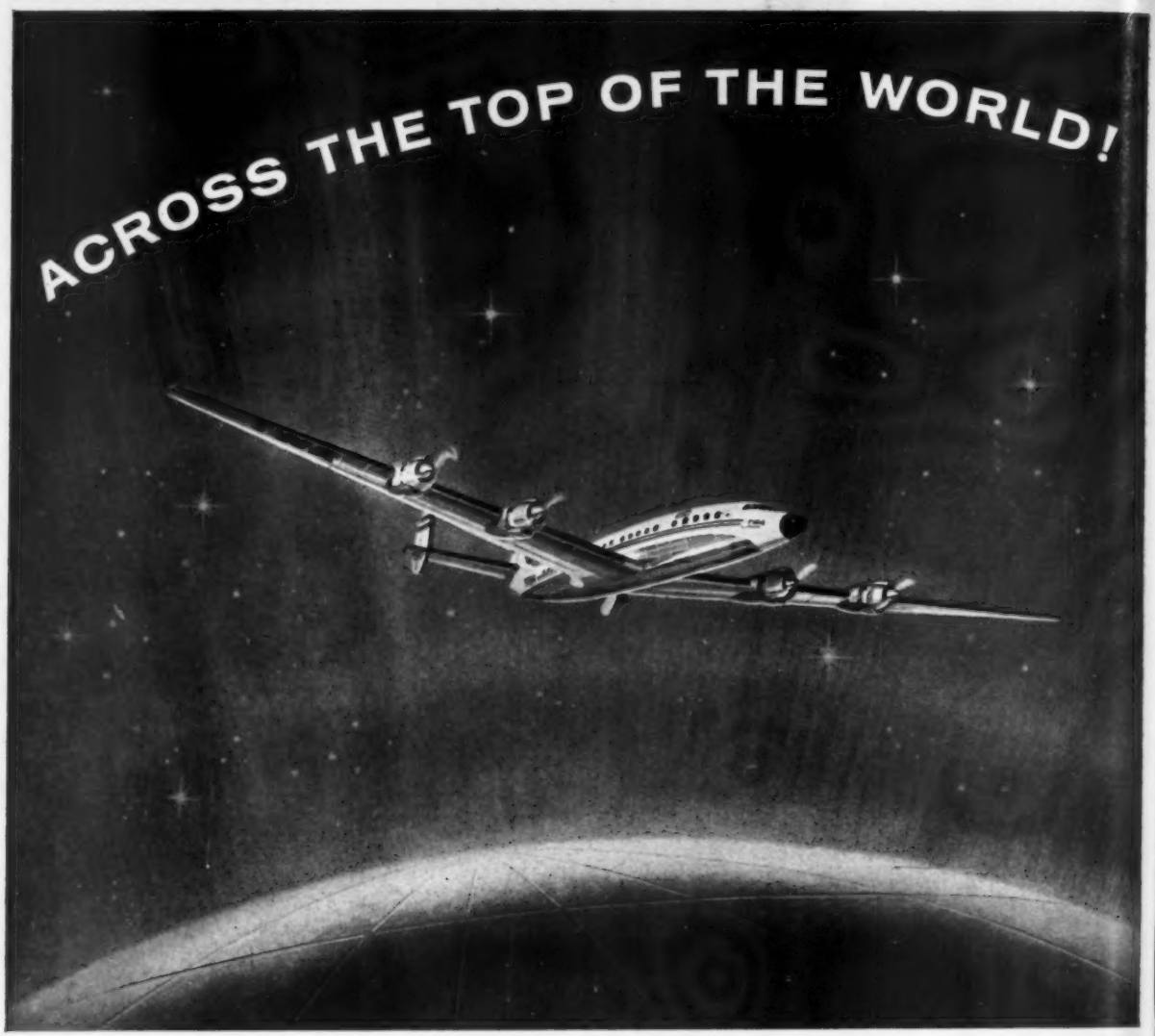
Scientists interested in unusual opportunities for advancement can grow with Avco.

For a copy of this Pursell illustration in full color, suitable for framing, write to "Art Reprints Department" at Avco Manufacturing Corporation, 420 Lexington Avenue, New York, N.Y.

Avco makes things better for America . . .

Avco

Avco Manufacturing Corporation
420 Lexington Avenue, New York, N. Y.



TWA JETSTREAM*

POLAR ROUTE TO EUROPE

Fly the short, fast, luxurious way to Europe from California! The swift Polar route . . . aboard the largest, longest-range airliner in the skies . . . the great new TWA Jetstream!

This giant Lockheed Starliner flies high above the weather to give you the smoothest flight ever. And with exclusive, synchrophased (anti-vibration) propellers, offers the quietest trip in history! Fly the Jetstream to Europe . . . the Polar way or non-stop from New York . . . on TWA! For reservations and information, call your travel agent or nearest TWA office. Polar service begins soon . . . watch for inaugural date!

FLY THE FINEST FLY TWA
TRANS WORLD AIRLINES

*Jetstream is a service mark owned exclusively by TWA.

UAL drafts blueprint for jet operations

Special committee meets monthly, tries to 'anticipate everything' that DC-8 service may entail

by Fred S. Hunter

IN THE AFTER-MIDNIGHT HOURS on a clear night recently, a DC-6 flew over San Francisco in preliminary test of a new system of aircraft position lights.

Bright flashers, red and green on the wing tips, white atop the tail, could be seen from 40 miles away, observers reported. Path of the airplane, they said, was clearly distinguishable.

The new-type lights were developed in the same United Air Lines electrical shop in San Francisco where the so-called Grimes anti-collision light, now in wide use by airlines, originally was designed.

"But this is not just a new-type light," said W. E. Rhoades, UAL's manager of flight engineering. "This is a new system."

It also is an example—one of many—of the way the UAL organization is preparing for the forthcoming jet age and its operation of Douglas DC-8s over its transcontinental and Pacific Coast routes.

Almost any place you set foot in UAL's engineering and maintenance base at San Francisco you'll find a DC-8 planning project in the works. Others are going on at Denver, where UAL's operating base is located, and at company headquarters in Chicago. Add them all up and you get an idea of the enormity of the planning program organized by this particular carrier to carry out the transition from today's 300/350 mph piston-engine transport to tomorrow's 550-mph jets.

"We are trying to anticipate everything," says W. C. Mentzer, UAL's general manager of engineering and chairman of its Turbine Aircraft Coordinating Committee.

This committee, which meets once a month in sessions lasting at least one full day, sometimes two or three, is the hub around which UAL's huge DC-8 planning program revolves. It is not merely a technical committee. Its purpose is to determine all of the varied problems connected with the introduction of DC-8s, then see that they are understood and followed up.

The committee devotes the same organizational care to its own meeting that it does to its DC-8 planning program. Detailed agendas are prepared for each session. All assignments are prepared in writing and incorporated into meeting working papers. An aggressive follow-up procedure is maintained to insure that all assignments are on schedule.

"Many areas of responsibility are dependent upon the completion of one assignment before the next can be completed," explains J. A. Stern, who acts as committee secretary.

In Chairman Mentzer and Secretary Stern, UAL's engineering department has two representatives on the coordinating committee. But its wide range of activity is illustrated by the diversity of its other members. They include: transportation services, F. A. Brown; flight safety, C. M. Christenson; economic controls, W. P. Feiten; sales and public relations, B. B. Gragg; medical, D. G. J. Kidera; personnel, C. M. Mason; finance, J. C. McAbee; flight operations, I. M. Sommermeyer; president's office, J. E. Moore.

In addition to periodic progress reports made to the general staff, UAL's coordinating committee writes up detailed plans. So far more than 35 such have been prepared and approved. Covered are such diverse areas as: a) navigation and air traffic control problems; b) ticketing and check-in pro-

DC-8 PLANNING—J. A. Herlihy, (left) vice president-engineering and maintenance for United Air Lines, goes over a report from UAL'S Turbine Aircraft Coordinating Committee with W. C. Mentzer, general manager of engineering, who also is chairman of the committee. Committee meets monthly to determine problems, plan procedures.

SCALE MODEL of jet hangar United Air Lines is planning to build on site adjoining San Francisco International Airport. It will be able to house four DC-8s and two DC-7s, will have cantilevered structure, 125,000 sq. ft. of floor space, center section for shops and offices.

cedures; c) maintenance hangar and shop requirements; d) cost control.

A DC-8 planning book is a constant guide to the business of the committee. It is revised frequently and each member has a copy. It contains basic DC-8 data, copies of all approved written plans, policy decisions regarding the DC-8 introduction program, assumptions to be used and a detailed tabulation of all assignments. A report incorporating the essential data in the planning book also is distributed to all persons working on DC-8 planning. A total of 115 copies of this report are now out.

Planning airport facility, too

UAL recently disclosed its plans for a $10-million passenger terminal at Idlewild. This new facility will be built specifically to handle the DC-8. At other airports, where UAL has no such control over the buildings it occupies, it is keeping city governments and airport managers advised of its requirements for space and facilities.

But UAL's planners are well aware of the fact that they're not going to get everything they ask for at airports. So they're setting up their plans, not on what they'd like to have, but on what they may reasonably expect to have by the time their DC-8s are operating. On runway improvements, for example, they're estimating what the actual circumstances will be at various projected dates, such as Jan. 1, 1960; July 1, 1960, and Jan. 1, 1961, at the 22 airports where DC-8s may be used.

It's no secret that greater efficiency in check-in procedures is needed if 124 passengers per trip (that's to be DC-8 capacity on UAL) are to be processed without swamping the airline's complaint department. Soon prototypes of a new baggage and check-in counter will be undergoing tests at two or three UAL stations.

A new procedure has been designed to check passengers in much more rapidly than at present. This procedure also is devised to position passengers at one of the two entrances to UAL's DC-8s, where instead of steps to climb they'll find "gangplanks" to walk straight into the cabin. These gangplanks—designed and developed by Lockheed Air Terminal and known as the Aerobridge—will be tried out first on DC-6 and DC-7 passengers enplaning and deplaning at O'Hare Field in Chicago.

Training is recognized as a crucial area in UAL's introduction program and a training sub-committee, which reports to the coordinating committee, has been meeting monthly since April 1956. Four people have been assigned to training planning on a full-time basis since June 1956. Many more are assigned part time. Complete outline and tabulations of all courses have been completed and an instruction manual is now in process.

Flight crews will be able to start familiarizing themselves with DC-8 operation nearly a year before an airplane is available via a Link simulator scheduled for installation at UAL's Denver operating base in mid-1958. An extensive flight training program with three NX airplanes will follow. The first NX plane is scheduled for delivery in May, 1959.

The Douglas schedule calls for CAA certification of the DC-8 in Nov. 1959, and, in accordance with this date, UAL is scheduling its start of service with the jets for Dec. 1, 1959. Thus it will have the benefit of more than six months of pilot and ground training time with the NX aircraft.

UAL's contributions significant

In a paper delivered before the Institute of the Aeronautical Sciences this summer, Ray D. Kelly, superintendent of technical development, called attention to the fact that UAL had contributed a great deal of technical and engineering effort "before the fact" that had influenced current jet transport designs to a substantial degree. UAL, said Kelly, wrote its first engineering report in October, 1946. Its explorations have been going on ever since.

Interestingly enough, the first formal jet transport proposal—in February 1947—came from Lockheed, which now hopes to sell Electra turboprops to UAL. The Lockheed design boasted a cruising speed of 540 mph at 30,000 feet, had a takeoff gross weight of 145,000 pounds and carried 40 passengers. It incorporated eight engines because the maximum thrust rating for the most advanced engines then was only on the order of 5,000 pounds each.

'Paper Jet' project launched

By 1952, UAL's technical development group was instructed to give priority to the jet transport studies and in May of that year the first issue of "UAL Tentative Requirements for a Jet Transport" for use within the company was completed. In June, the first "Paper Jet" project was launched. This was a simulated day-in-day-out operation over UAL's system with a hypothetical airplane conforming to UAL's requirements.

Continuing for over a year, in which 608 simulated flights were logged, Paper Jet No. 1 demonstrated that the "schedulability" of jet transports should be as good or better than current long-range, piston-powered aircraft. Moreover, it confirmed that by taking advantage of weather knowledge there should be no particular difficulty with respect to planning for fuel reserves. A great deal of operational confidence was gained from this paper jet operation.

Now UAL is engaged in Paper Jet No. 2. It's identical in its evaluations with respect to wind and meteorological conditions at the higher altitudes, but this time the simulation flights are being flown with actual DC-8 characteristics written into the calculations. Scene of this daily simulated operation is Denver, where H. T. Harrison, Jr., director of weather service, supervises the exercises after which the airline's 550-mph flight plans of the future will be patterned.

High on the coordinating committee's priority list is ground handling.

SPECIALLY DESIGNED baggage cart designed by UAL engineers to expedite DC-8 baggage job is undergoing tests in San Francisco. Low-level dimensions enable cart to be moved around and beneath airplanes without too much interference.

STARTER CART prototype of ground engine-starting vehicle assembled by UAL for DC-8. Using standard components, it is expected to effect savings in equipment and enable UAL to avoid carrying an air supply aboard aircraft.

What about airport noise? Reports were conflicting. What about jet blast at gate positions? Reports disagreed. UAL decided to find out for itself.

With cooperation from the Douglas company and the Navy, arrangements were made for a series of tests using a twin-jet Navy A3D aircraft, first at the Douglas El Segundo plant, subsequently at the San Francisco International Airport.

The P&W J57 engines in the A3D were adjusted to simulate the noise levels of four engines in taxiing and maneuvering on the apron. Data on noise, blast effect, odor and temperature was collected and evaluated. Blast fences and sound protective enclosures were evaluated.

These tests, which were witnessed by other airlines, the CAA and the management of the San Francisco airport, have convinced UAL's experts that jet transports can be handled on the ramp like other airplanes. They won't have to be towed out to the end of runways.

Blast fences, UAL found, are very effective in deflecting noise away from the area. Observers actually were surprised how much protection they afforded. One significant point—they held down the high frequency squeal.

In its experiments, UAL used blast fences ranging from four to 10 feet in height. Six feet, UAL reports, will turn the trick.

JP-4 doesn't smell sweet

But so often there's a little sour along with the sweet, so UAL has to report one slightly negative aspect to its findings from the A3D tests. The big problem on the ramp may be odor. The fragrance of JP-4—or kerosene—isn't exactly the same as Chanel No. 5.

Almost immediately after UAL selected the DC-8, studies were begun to determine the necessary ground equipment.

Needless to say, one of the first questions to come up was: "What do we do about engine starting?"

When price quotations began coming in with proposals from equipment manufacturers, UAL put its engineering department to work on a design of its own. Something that wouldn't give the company comptroller the shudders. The result is a standard jeep truck, carrying a standard air tank and a standard compressor, plus a combustor unit to heat the air for cold day starts. The tank stores enough air at 500 pounds pressure to get two starts. UAL plans to use the ground equipment to start two engines which in turn will be used to start the other two.

The importance of an economical ground-starting system is doubly important in view of UAL's plan to save weight and space by avoiding the installation of air containers in its airplanes.

All the stations on the system where DC-8s may land will have to be equipped with ground systems.

UAL's jeep unit is now undergoing preliminary tests at San Francisco, and later will be turned over to AiResearch for tests with the combustor unit.

UAL's 30-plane DC-8 fleet will comprise 12 airlanes powered by P&W J57 engines and 18 with P&W J75 engines. The carrier anticipates no trouble in absorbing the turbine engine. "We fully expect to have a substantial improvement in reliability with the jet engines," said J. A. Herlihy, UAL's vice president of engineering and maintenance.

Less simple will be the problem of educating employes to the new system reflected by the DC-8. The AC power system, for example, will be new to maintenance and people long accustomed to aircraft electrical systems employing DC power. For its DC-8s, UAL has chosen an electrical system incorporating four 20 KVA alternators.

San Francisco base well-equipped

UAL gets off to a fast start in planning its DC-8 maintenance program because it already has a well-equipped, efficient overhaul and repair base in operation in San Francisco. When UAL first opened this base a few years ago, its $5-million cost was regarded as a staggering figure. Since then additions and expansions have boosted the figure to $15 million and still more will be spent to prepare for the DC-8.

The big overhaul hangar already includes one dock big enough for a DC-8. One dock to 30 airplanes is about the right ratio, but UAL probably will provide additional dock facilities. It now has Wallace Clark & Co., industrial engineering consultants, engaged in a new round of studies on its DC-8 needs at the San Francisco base.

UAL is starting construction shortly on a new line maintenance hangar at San Francisco, nearer the passenger terminal, and when this is completed it will release four additional docks for use by the overhaul base.

The detail with which UAL's Turbine Aircraft Coordinating Committee attacks every problem in its planning program reflects this airline's understanding of what it faces in the revolutionary transition to the operation of jet-powered transports.

Paper Jet No. 2 is a case in point. If a pilot encounters unexpected weather and loses a little time flying a DC-7 coast-to-coast today, it's no great problem. Passengers are generally good natured, it's just a little delay and about the only fuss anybody makes is when too many of them show up on the more-than-15-minutes-delay report.

But with jets it's a different story. With their high fuel consumption a 35- or 40-minute en route delay could cost the profits of a trip. So, come 1960, UAL wants its pilots to know which is the cold side if they should happen to run into a jet stream streaking along in the opposite direction. It will be easier both on the passengers and the stockholders.

BROCHURE

WITH A SMILE*

SEND DRAWINGS OR PRINTS FOR QUOTES

METAL SPINNING
HYDROFORMING
SPINFORMING
FABRICATIONS

or write for our

★NON-TECHNICAL Literature ☐

TECHNICAL Literature ☐

High speed facilities, unexcelled workmanship and consistent research keep this shop available to designer, engineer and purchasing agent working with advanced concepts.

ROLAND TEINER
Company, Inc.

Dept. 66 — 134 Tremont Street
Everett 49, Massachusetts Tel. EV 7-7800

ENGINEERING REPRESENTATIVES IN MANY CITIES

Circle No. 36 on Reader Service Card.

Distinctively Different...

New York's friendly hotel... minutes to Grand Central, 5th Ave. shops, theatre district. All outside rooms; radio, TV, circulating ice-water, tub and shower! Everything to make you feel "at home".

Home of the famous 'Hawaiian Room'

Hotel Lexington

Extensively Air-Conditioned

LEXINGTON AVE. AT 48th STREET
PLAZA 5-4400—NEW YORK CITY 17, N. Y.

See your local travel agent or write for Brochure 144

BOSTON Hancock 6-6625 | MIAMI Franklin 9-8331 | CHICAGO Dearborn 2-4432

WHY TAKE CHANCES?

GET GREATER PROTECTION FOR YOUR AIRBORNE OXYGEN BREATHING EQUIPMENT WITH A PURITAN HIGH PRESSURE FILTER UNIT

Protect regulators and other sensitive parts of your aircraft oxygen system against costly damage due to pressure surge. Puritan's High Pressure Filter Unit gives you these important advantages:

- Precision metal-to-metal seal avoids leaks.
- No special tools needed to install or replace filter.
- Sintered bronze filter, pore size .0017.
- Easy to install on upstream side of regulator or manifold.
- Rugged construction—corrosion resistant—light weight.

Quality materials plus fine craftsmanship — that's Puritan.
When ordering, specify No. 118001 High Pressure Filter Unit.
Price $4.50 each F.O.B. Kansas City.

Aviation Division

Puritan SINCE 1919

COMPRESSED GAS CORPORATION
2010 GRAND AVE. KANSAS CITY 8, MO.
Circle No. 37 on Reader Service Card.

PIONEER MANUFACTURER OF AVIATION OXYGEN BREATHING EQUIPMENT

Coach-air service between London and Paris works well despite slower travel time

by Wayne W. Parrish

ONE OF THE LARGEST British independent airlines, Skyways, has been building up quite a record with a novel coach-air service between London and Paris. I tried it out several months ago and found that it works very well. And it saves a lot of money.

You board a coach, or bus, in the heart of either London or Paris, then motor either 65 miles to the British airport of Lympne on the coast of the English Channel, or 45 miles north of Paris to the airport at Beauvais, whichever direction you happen to be traveling, and then board a 36-passenger DC-3 for the 111-mile gap by air across the Channel and northern France.

The entire journey takes five hours and 55 minutes. If you fly the regular British European Airways or Air France routes, the journey from centers of London or Paris takes three hours and 35 minutes.

Service saves you money

So why take the longer coach-air service? The reason is very simple. You save money.

The Skyways fares vary from an off-peak low of $22.26 roundtrip to standard of $27.86. The BEA and Air France fares range from a night tourist low of $30.96 to $43.40 for regular tourist and $55.72 for first-class, all roundtrip. So for the extra two and a half hours of extra time involved, a lot of people are finding the savings worthwhile.

In fact, Skyways expects to carry about 100,000 passengers this year, double last year's total. And just this year, Skyways joined the International Air Transport Association.

The coach-air operation is an ingenuous method of overcoming the opposition of both British and French governments to divert competitive services with BEA and Air France. Neither BEA nor Air France has ever exploited the mass market on this route but they blame one government or the other for restricting flights.

Although the percentage of air passengers has increased steadily year by year, the bald fact is that even in 1957 a majority of passengers continue to use the long, tedious and usually uncomfortable sea-rail services. In 1956, 481,451 passengers went by air but 667,166 went by one of the sea-rail routes, the fastest time of any of these being 7 hours and 13 minutes and the longest 14 hours and 33 minutes.

Competes with sea-rail service

Skyways, with its austerity service, is able to compete price-wise with the sea-rail services. Its fares are under all but a very few sea-rail fares and of course Skyways beats the surface routes by wide margins.

It's a simple journey by Skyways. The Paris terminal is in a hotel. The coach trips through the English and French countrysides are pleasant interludes and the transfers from coach to plane to coach are rapid and easy.

If air finally overtakes the old sea-rail combination it will be due to the initiative of Skyways, an up-and-coming independent sparked by an energetic businessman named Eric Rylands.

Skyways has many charter operations with larger but old aircraft, and this year opened a new coach-air service from London to the Riviera, using coach to Lympne, plane to Lyon and coach to Nice. But the French railroads, fearing loss of business, have pressured the French government into restricting the number of Skyways flights per week.

Rylands has lots of plans up his sleeve for more combination coach-air routes in the future.

SKYWAYS combines buses with its DC-3s to give passengers 5 hr., 55 min. service between centers of London and Paris, competing favorably with sea-rail service.

Viscount promotion pays off for Capital

by Anthony Vandyk

"THERE'S a New Sound in the Cash Register"—that could be Capital Airlines' current slogan, replacing "There's a New Sound in the Sky," one of the catch phrases successfully used during the introductory phase of the airlines' turboprop transport program.

The Viscount has certainly paid off for Capital. Thanks to a tremendous selling job by James W. Austin, (Vice President-Traffic and Sales) and his staff, Capital has been doing a land office business this summer.

The accompanying AMERICAN AVIATION survey for the month of July of five major scheduled airlines shows that revenue passengers carried during the period were 19% over July a year ago and that revenue passenger-miles flown increased 17.2%.

Capital Airlines had the greatest increases with revenue passengers carried up 42.5% and revenue passenger-miles flown 59.5% above a year ago. Capital's load factor was 2.96 points above July 1956 giving it the greatest increase in this category also. This year Capital expects that its gross revenue will come close to the $100-million mark.

Serving all major markets

Capital Airlines has now fully integrated its fleet of 59 Viscounts and uses them in almost all its major markets. The turboprop transports are flying about 1¼-million miles a week. In a recent week (that of July 20) the Viscounts logged 1,257,000 miles compared with 96,372 for Capital's Constellation fleet. The figures for the DC-4 and DC-3 fleets, respectively, were 99,907 and 120,567.

Discussing the use of the Viscounts Vice President Austin explains: "We have not scheduled them for load factor but for profitability. I'd rather have a 50% load factor on a long haul than an 80% factor on a 200-mile run. Thanks to the Viscount, in less than two years we have matched and sometimes exceeded competitors who have been in the market up to 25 years."

New route authorizations and the Viscount have worked wonders for Capital. In May 1956 the airline carried only 19,000 passengers out of New York, yet in June 1957 the figure was over 40,000. New York and Chicago are now the two top cities, in terms of traffic carried, served by Capital. Until very recently Washington was always No. 1.

Capital Airlines is now the No. 1 carrier out of Detroit. The growth there has been little short of phenomenal. It was only just over a year ago—April 10, 1956—that Capital started in on the New York-Detroit route with four Viscount roundtrips daily.

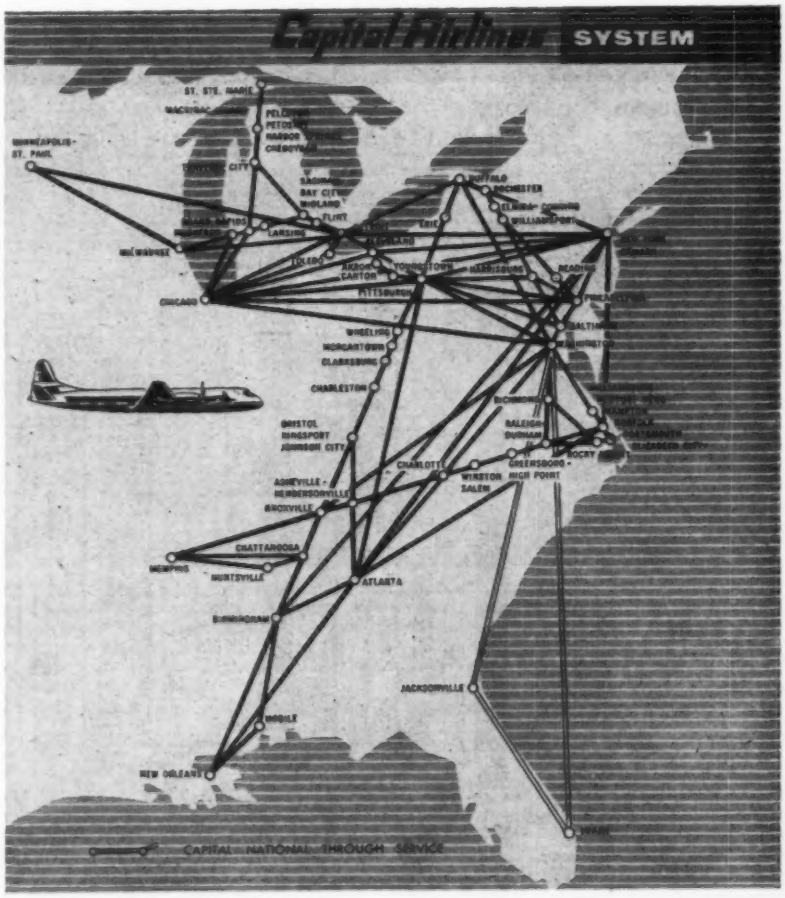
Frequencies were boosted every few months to meet the demand with the result that since April 28 of this year Capital has offered 10 nonstop roundtrips daily over the route. Only American can match this frequency with its 12 roundtrips.

The most spectacular progress of all has been achieved by Capital Air-

Traffic for July 1957, compared with July 1956

Airline	Revenue Passengers	Percent Increase	Revenue Passengers Miles	Percent Increase	Load Factor	Increase or Decrease
American (1957)	702,000	+ 9.3	473,000,000	+ 8.1	67.9	+1.4
American (1956)	642,400	....	437,500,000	....	66.5	....
Capital (1957)	**341,000**	**+42.5**	**130,000,011**	**+59.5**	**56.2**	**+2.96**
Capital (1956)	**239,311**	....	**81,517,000**	....	**53.24**	....
Northwest (1957)	135,184	+16.4	94,913,199	+14.9	63.80	+1.95
Northwest (1956)	116,138	....	82,633,000	....	61.85	....
TWA (1957)	448,315	+32.2	369,860,000	+24.9	70.80	+2.81
TWA (1956)	336,498	....	296,076,000	....	67.99	....
United (1957)	618,705	+12.0	488,397,000	+13.7	69.32	—0.26
United (1956)	552,228	....	429,539,000	....	69.60	....
TOTAL (1957)	2,245,204	+19.0	1,556,170,210	+17.2%		
TOTAL (1956)	1,886,575	....	**1,327,265,000**	....		

SOURCE: American Aviation Survey.



IN THE PAST 18 MONTHS Capital has been allowed to fly nonstop between many new markets although no new cities have been added to the system. New nonstop authorizations included New York-Chicago, New York-Detroit, New York-Norfolk, New York-Rochester, New York-Buffalo, Philadelphia-Pittsburgh and Philadelphia-Chicago.

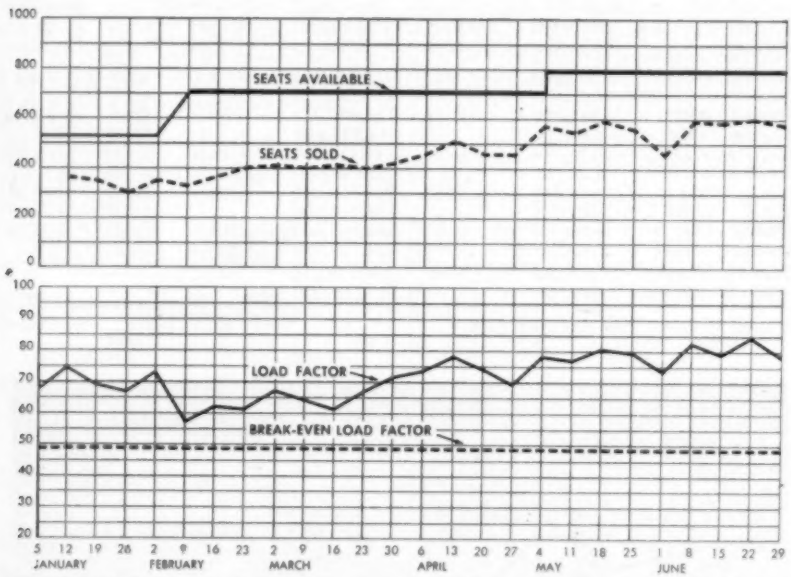
lines on the Washington-Chicago route where it now schedules 11 nonstop round flights daily, against three in August 1955, the first full month in which the Viscount was in operation. For the record it is of interest to note that in that month of August 1955 American Airlines had five nonstops on the route; TWA, three; and United, four. Today while Capital has 11 flights, American has only two and TWA just one. United, on the other hand, has gone up to five.

The story on the New York-Chicago route, although less spectacular since Capital has only comparatively recently been given nonstop rights between the two cities, is nonetheless significant. With its current eight flights daily between New York and Chicago, Capital offers the same nonstop frequency as does TWA and twice as many flights as Northwest's four. It is, however, well behind American's 20 flights and United's 13. Nevertheless, considering that the New York-Chicago route was opened only a year ago (September 1956) the progress must be considered as highly satisfactory.

Vice President Austin is highly delighted with the continuing favorable response to the Viscount. The volume of complimentary letters received by Capital shows no sign of falling off. He believes that Capital's Viscount customers represent the "intelligentsia of the airline market"—flight for flight, a higher percentage of Air Travel Plan card holders select the Viscount than any other aircraft. This has resulted from a planned selling program which now extends back several years.

Austin points out that putting over the Viscount to the traveling public in the U.S. was far more than just a campaign to introduce a new aircraft. "We had to do everything—even teach Americans how to pronounce it," he comments. Unlike the DC-7, which was introduced by several operators in the U.S., the Viscount had to be promoted by one airline—Capital, the only U.S. carrier that had ordered it. There was a "pre-introduction" selling campaign, then an introductory campaign and subsequently a series of programs to consolidate on the success of the Viscount.

A separate campaign is planned for each new city where Viscount service is inaugurated. To date Austin reckons he has conducted some 75 separate selling campaigns for the aircraft. As the accompanying figures show, the campaigns have more than paid off.



ILLUSTRATIVE of Capital's success story with Viscount is progress on Washington-Chicago route. Chart shows how nonstop capacity and traffic have grown for first six months of 1957. Data are for nonstop standard flights only.

Load-factor analysis of Capital's major nonstop segment

Week of June 23-29, 1957

Nonstop Segments		Mileage	Standard: Route Frequency	Standard: Load Factor	Off-Peak: Route Frequency	Off-Peak: Load Factor	Off-Peak: Adj. Load Factor [1]
New York—	Atlanta	762	2	66.5	1	70.5	90.0
	Birmingham	851	1	64.8			
	Buffalo	292	4	63.1	2/7	86.4	
	Chicago	724	7	68.7	1	56.3	73.6
	Cleveland	418	8	63.1	1	44.7	75.4
	Detroit	511	9	73.4	1	71.1	88.1
	Norfolk	286	3	60.2	2/7	59.1	
	Pittsburgh	334	8	80.9	1	34.1	51.2
	Rochester	254	3	78.0			
	Washington	200	4	69.8			
Washington—	Atlanta	547	3	66.3	1	61.9	75.5
	Chicago	600	9	79.2	2	78.6	98.5
	Detroit	310	2½	74.7			
	Cleveland	415	4	63.8	1	50.8	55.4
	Milwaukee	635	1½	75.6	1	78.8	90.0
	Norfolk	143	6½	80.4	1½	65.6	76.1
	Pittsburgh	204	5½	66.2	1	81.1	97.2
Chicago—	Buffalo	468	3	69.5			
	Cleveland	307	5	63.6			
	Detroit	219	6	74.5			
	Pittsburgh	403	4	74.7			
Detroit—	Buffalo	250	3	56.1			
	Milwaukee	228	8	59.9	1	36.6	49.6
	Pittsburgh	212	3	69.8			
Philadelphia—	Chicago	669	2	68.5			
	Cleveland	363	2	67.7			
	Detroit	464	3	59.3	1	36.0	46.0
Atlanta—	Pittsburgh	527	2	79.5	1	90.3	104.8
	New Orleans	427	2	43.6			
Minneapolis—	Detroit	519	4	69.9	1	60.5	77.5
	Milwaukee	297	4½	58.1	1	58.5	70.5
Cleveland—	Detroit	105	10	54.1	1	53.9	62.8
	Milwaukee	329	3	71.5	1	43.7	69.4
Pittsburgh—	Baltimore	209	3½	70.7			
	Birmingham	600	1	73.8			

[1] Actual Load Factor adjusted to show load equivalent of cargo carried.

Aeroflot steps up Tu-104 jet flights

Aeroflot is steadily increasing the number of services operated with the Tupolev Tu-104 jet transport. The Russian airline now has seven weekly Tu-104 flights on the Moscow-Tashkent run as against one through May 31 and three through July 31. The transcontinental service has also been stepped up.

Seven Tu-104 flights operate from Moscow to Irkutsk via Omsk against four in the early part of the summer. Another weekly flight over this route is labeled "international" since it continues to Peking.

Omsk gets excellent jet service from Moscow, for, in addition to the above-mentioned flights, it is also served by a weekly Moscow-Omsk-Novosibirsk schedule. There are three other weekly Tu-104 flights from Moscow to Novosibirsk, via Sverdlovsk. The Moscow-Tiblisi (Tiflis) schedule remains weekly throughout the summer.

Apart from the domestic routes radiating east and southeast from Moscow, Aeroflot now has Tu-104 equipment on a twice-weekly regional service—Novosibirsk-Tashkent-Tiblisi (one of these schedules terminates at Tashkent).

International service with the jet transport continues to be restricted to the Moscow-Prague route, which is operated on a daily frequency, and a weekly Moscow-Omsk-Irkutsk-Peking flight.

Overdue: new rules on entertaining by airlines

by Eric Bramley

IT SEEMS THAT a rewriting and clarification of rules covering entertaining by airlines are needed. For a long time, the Air Traffic Conference and the International Air Transport Association have had regulations which attempt to spell out just what an airline can or can't do in entertaining at travel agents' conventions. A number of fines have been levied for violations. In brief, open houses, scheduled parties or announced entertainment are banned. But there's no rule against "informal entertainment of such agents in private hotel suites or rooms occupied by representatives of a member." ATC's enforcement office claimed that Capital Airlines held an open house in its suite at last winter's ASTA convention. A $200 fine was levied. Capital said it was entertaining informally in the suite and refused to pay the fine. An arbitration panel ruled in favor of Capital. It was the first time an ATC case had been taken to arbitration. The point is that the entertainment rules need revamping. Somehow, they should be made more specific. Airlines have cussed this situation for years. In view of the Capital case, why doesn't somebody try a rewrite?

Although Eastern Air Lines has long been thought of as a domestic carrier, Johnny Mitchell, the company's station manager at New York International Airport, now finds himself dispatching flights to Bermuda, Mexico, Montreal and Puerto Rico. And all within a half-hour period.

Here's an item that should be of considerable interest. Telephone answering time has been one of the airlines' biggest reservations headaches. And it's been hard for a carrier to check to determine if calls were being answered fast enough. Sample calls were made and answering time plotted, but the sample was small and real control of the situation wasn't possible. But now American Airlines may have the answer. Working with the telephone company it developed a "time delay circuit," now being tested in Detroit reservations. This device times all calls that are delayed over the allowable time. For any given period, the reservations manager can total these, divide by total calls handled and get the percentage of delayed calls. Detroit checks the meters each hour, knows when it's running into trouble, and takes corrective action immediately. This should be a big help not only to the airline but to the customers who get tired of holding a dead telephone for what seems like forever.

Odds and ends: Airlines sometimes get criticized for poor service to communities. So Allegheny Airlines was pleased and flabbergasted when, out of the blue, the Bradford, Pa., Chamber of Commerce presented it with a plaque as a "testimonial of sincere appreciation of splendid leadership in promoting the industrial expansion and prosperity of the Bradford area" . . . A survey of the quality of airline service is being conducted by American Institute of Management, 125 E. 38th St., New York. It lists 27 airlines and wants to know what kind of service you've had from them in the past two years—excellent, adequate or poor . . . Several readers have expressed interest in the item which appeared here July 29 about Eastern Air Lines helping Strayer Business College train prospective secretaries in how to make airline reservations for their bosses. You can obtain more information from Ed Peterson, EAL traffic & sales office, Washington National Airport, Washington, D. C.

TEN NEW Jeep lavatory trucks have been delivered to United Air Lines by Willys Motors Inc. They are used for disposal of refuse from planes' lavatories, replacing tractor-towed units, also pump fresh water into planes for lavatory flushing purposes. Truck has 210-gal. tank for refuse and 106-gal. tank for water. Immersion heater in water tank prevents freezing. Each truck will service 25 planes before it has to be cleaned and retanked with water.

Sales, Traffic, Promotion

Air **France** brochure describes three new safaris to French West Africa, French Equatorial Africa, Belgian Congo, British East Africa, Union of South Africa and Rhodesia. All-inclusive cost of 36-day safari is $2,396 . . . BOAC on Sept. 20 will run a 15-day "investment brokers' tour of Europe," giving U.S. brokers a look at European exchanges, industrial plants and craft workshops. Price, $980.

United Air Lines' ads stressing radar are eye-catching and effective. Best series in years . . . UAL offices have been answering the phone: "United Air Lines —the radar line" . . . The company is now using three types of ticket envelopes —one for regular flights, another for Red Carpet passengers, and a third for 100,000-Milers . . . It's also distributing pocket-sized cards comparing air and rail fares. For example, since eastern railroads were granted a fare increase, a Chicago-New York train trip costs $61.72 with lower berth, against $45.10 first-class air.

Northeast Airlines has bought time on the nightly WMCA Barry Gray show in New York and is experimenting with a "hard sell" program of two-minute spots on WVNJ around the clock. It's plugging Cinderella Holiday packages to Miami Beach . . .

Trans-Texas Airways' five-minute aviation newscast, "Wings Over Yourtown," is now being aired over 29 radio and TV stations.

fly BRANIFF... largest, oldest airline serving the heart of both Americas

Over 50 cities in the U. S. A. and 10 in Latin America

BRANIFF *International* AIRWAYS

General Offices: Dallas, Texas

SAM SAINT SAYS

The Curtis Team in Wonderland . . .

EIGHT MONTHS AGO this column discussed a "Tough Hurdle for Mr. Curtis": the need to discover first what actually is the air traffic control problem and to define the operating characteristics of the wanted solution. We suggested that pilots and dispatchers and ATC controllers might be needed to spell out what an ATC system must do.

Time has marched on. The Curtis team afforded pilot and controller groups little more than courtesy hearings. The result is inevitable. The report we hoped would lead us out of the wilderness strewed the way with boulders of operational impracticability. It is doubtful whether the Curtis team's technical recommendations will survive more than the first round of blind support almost always accorded efforts of this kind.

Take the man-machine relationship, one of the most important decisions at the beginning of the road. To go seriously wrong at this point is to be wrong in most of what follows.

The Curtis team recommends that the "human controller . . . retain his vital role as the decision-making element of the system." Automatic displays and automatic data transfer devices and signal links to aircraft will help the human decision-maker. Electronic computers will comput and extrapolate data in vaguely defined ways. But all machine operations "will have to be open for inspection, review, judgment and understanding approval or veto by human engineers."

Today's harassed controllers, who daily perform near miracles to keep traffic moving, are told by the Curtis team that "The MEN, not the machine, have to set the pace of . . . operations." Controllers are supposed to sooth their ulcers with the dazzling array of chromeplated knickknacks with which they will be surrounded. They may be blinded for a time, but they will soon learn that this system still leaves squarely on their shoulders the total burden of safety, a weight already grown to terrifying proportions.

Probably 98% of the routine decisions of control today require no human judgment at all. The controller applies fixed rules to known facts. The answer is precalculated. No thinking. Just work.

Why the Curtis team refused to let a machine lift the load of routine decisions from the controller's back is beyond comprehension. Applying numbers to the problem makes the team's action even more incredible.

Picture the New York control center of 1975 with 150 controllers issuing 18,000 control "decisions" in a peak hour. An individual controller's load may require *four control decisions per minute* for brief periods. At the instant of making each decision the controller must have a comprehensive mental picture of the particular aircraft and the other traffic around it. He must know the types of aircraft, their performance capabilities, destinations, intended future flight tracks in three dimensions of space and the fourth dimension of time. All this in 15 seconds.

And all the while the controller knows that an unexpected interruption of traffic flow can start a chain reaction that will send his workload skyrocketing off scale.

In the present control operation, the method of coordinating one controller's actions with another adds hazard and slows traffic. By some sort of wand-waving this problem vanishes in the Curtis team's wonderland of the future. It must have vanished because each controller is to have his own little empire—a fenced off piece of sky. "Each controller will be an independent cell, able to clear aircraft . . . and hold safely all aircraft under his jurisdiction."

It is difficult to understand how a controller, surrounded by a maze of other independently controlled empires, can "assure each pilot that he can safely go ahead as planned for the next half hour or so."

One wrong decision leads to other wrong decisions. When the Curtis team built its system around a human decision-maker, the next wrong step could have been predicted with certainty: As a result of overloading the human it became necessary to fit congested area traffic into an operational strait jacket. The report calls for the use of "non-conflicting paths . . . to minimize the number of natural points of confliction."

Someone should have told the team we are using non-conflicting routes today to keep the controller from going under. But we pilots don't like the extra miles and the awkward routes and altitudes required. We don't like the chaos created within the strait jacket when a key airport goes below limits and traffic has to be diverted without advance notice. We want something better for the future.

Where the serviceman hangs his hat

From Coast to Coast watch for this Crest of good living when you travel. For business men and for Gov't personnel it represents the top in service.

In Washington it's
The Hotel RALEIGH
Close to all transportation. Pentagon buses across the Street. Within walking distance of many other Government buildings.

In Pittsburgh it's
The Hotel SHERWYN
In Hartford it's
The Hotel BOND
In Cincinnati it's
The Hotel SINTON

OTHER FAMOUS MASSAGLIA HOTELS

New York City
HOTEL NEW YORKER
Hartford, Connecticut
HOTEL BOND
Denver, Colorado
PARK LANE HOTEL
Albuquerque, New Mexico
HOTEL FRANCISCAN
Long Beach, California
HOTEL WILTON
Honolulu, Hawaii
HOTEL WAIKIKI BILTMORE

MH
MASSAGLIA HOTELS

Radar "Weather Eyes" now on more than 75% of Delta's modern fleet

through radar, Delta introduces the Velvet Ride on

DC-7B's
DC-7's
DC-6's
CONVAIRS

Delta's million-dollar radar installation program—fast nearing completion—is the latest example of Delta's policy of bringing the finest service possible to its passengers. With new Collins Radar "Weather Eyes," Delta Captains can select the smoothest possible skyway to give passengers a Velvet Ride to their destinations. Delta provides Radar on both deluxe and aircoach services throughout its 60-city system in the U.S.A. and the Caribbean.

Delta AIR LINES

ONE OF AMERICA'S PIONEER SCHEDULED AIRLINES

TRANSPORT TRENDS

The domestic airlines' critical fare situation, accented by CAB's 4-1 vote in late July against a 6% increase, is relatively inactive pending issuance by the Board of a formal order and opinion giving reasons for denying the fare hike. Until such an order, carriers can't ask for reconsideration. CAB has until Sept. 28 to issue the order.

Rumors that G. T. Baker, president of National Airlines, would be willing to sell his substantial interest in the airline simply aren't true, he says. Not only would he refuse even the most tempting offers, he adds, but all sorts of expansion plans are underway.

Capital gains legislation, under which airlines would retain profits from aircraft sales without any subsidy offset, got further in Congress this year than last, but will still be "pending business" when the second session starts in January. Two other airline financial bills—government guaranteed loans and equipment trust certificates—passed Congress and need only the President's signature to become law.

American Airlines may inaugurate Chicago-Mexico City nonstop service about October 30, a move that will mark final implementation by U.S. carriers of routes gained in the new bilateral agreement with Mexico. AA was picked over Braniff Airways for the route in a CAB decision approved by President Eisenhower last week.

Braniff will be permitted to hold onto its inactive U.S.-Mexico City certificate. The President and CAB expressed hope that the company will get operating rights when the U.S.-Mexico agreement comes up for review in 1959.

CAB will decide prior to September 18 whether to permit a 10% increase in east-west general commodity air freight rates. The agency suspended Slick Airways' proposed increase which was to have become effective September 1. But the suspension was limited to a 17-day period to permit consideration along with similar increases of American, United, Western and Flying Tigers, slated to become effective September 18.

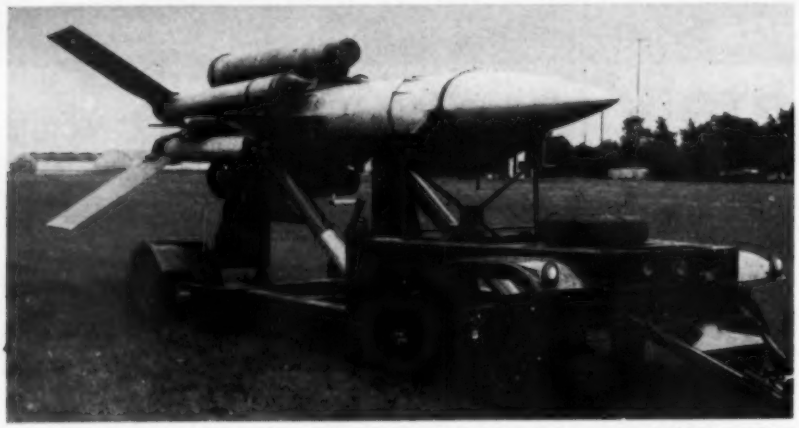
International airlines will find it increasingly difficult to get CAB approval of rate and fare resolutions which do not reflect a downward trend. House antitrust committee, which successfully prodded CAB into a domestic general fare investigation, is now critical because the Board threatened but "failed to take affirmative steps" to rule out the rate-making mechanism of the International Air Transport Association.

House group doesn't believe an "open rate" situation in the international field would lead to economic chaos. "The time to restore competitive conditions to the international air transport industry is long overdue," it said. To strenthen CAB's power in the international rate field, the committee will back long-pending legislation which would give CAB the same control over international fares as it has over domestic fares.

Last issue on this page it was noted that Ray Cook, one of Howard Hughes' top attorneys, had opened an office on TWA's main executive floor at 380 Madison Ave., New York. He did—for awhile. But now he's back in his Houston, Tex., office.

INDUSTRY

Saunders-Roe turbojet-and-rocket-powered interceptor makes unexpected appearance at SBAC show



BLOODHOUND surface-to-air missile, in quantity production, uses two Bristol ramjets.

LONDON—This year's Society of British Aircraft Constructors Show at Farnborough (AMERICAN AVIATION, Aug. 26, p. 58) featured no major surprises. One unexpected item was the appearance of two mixed-power Saunders-Roe SR-53 research interceptors carrying wingtip-mounted de Havilland Firestreak missiles. The SR-53 is powered by a Viper turbojet and a Spectre rocket.

Short Brothers & Harland exhibited a subsonic surface-to-air missile for local defense. It is also usable for surface attack. The missile features integral-boost and single-sustainer dry rockets. It is a cruciform design controlled by variable-incidence wings with fixed tail. Short Bros. & Harland also released data on a helicopter visual flight simulator.

Vickers-Armstrongs unveiled a wire-controlled anti-tank rocket missile. Rolls-Royce revealed a double-orifice thrust reverser and a new silencer for civil Avons and Conway engines. Another Rolls-Royce new exhibit was the RB.108 jet lift engine. This is a small axial turbojet with machined compressor casing and a short, fat combustion turbine zone.

AIA manufacturers council elect regional officers

Aircraft Industries Assn. Aircraft Manufacturers Council has elected C. J. McCarthy, chairman of the board of Chance Vought, and George M. Bunker, chairman of the board and president of The Martin Co., chairmen of the western and eastern regions.

William M. Allen, Boeing president, was elected vice chairman of the western region and James S. McDonnell, president of McDonnell Aircraft, was named vice chairman of the eastern region.

Election of new officers of AIA's Public Relations Advisory Committee have also been announced.

Chairman of the eastern region is Carlyle H. Jones, director of advertising and public information for Sperry Gyroscope Co. A. V. Cline, director of public relations for Northrop, is western region chairman.

TWA reorganizes passenger service set-up

Trans World Airlines has organized its Passenger Service Department to provide more attention to the specialized requirements of international and domestic travelers.

Pierre G. DeSautels has been named vice president—passenger service, replacing John H. Clemson who will undertake special assignments for president Carter L. Burgess.

John N. Martin, formerly eastern region general sales manager and more recently general manager—passenger service, returns to sales department as special assistant to senior vice president—sales.

J. I. Greenwald will fill the new position of general manager—passenger service, international, with headquarters in Paris.

George Friedrich, district passenger service manager for Washington, will become system manager—service inspection.

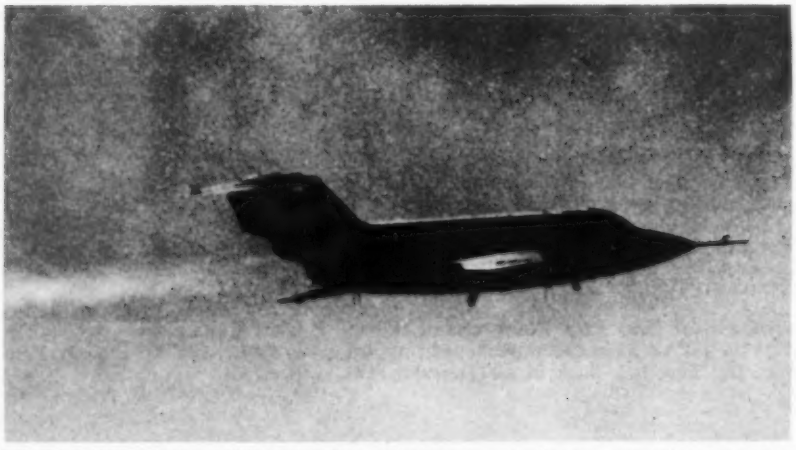
Passenger service functions within the U.S. will be administered through two regions instead of three as formerly. George Levering, with headquarters in New York, and V. J. Scott, Los Angeles, will be regional directors of passenger service with the Mississippi River dividing their regions.

C. E. Kaul, New York, will be U.S. assistant to the general manager—passenger service, international, acting as liaison and coordinator between domestic and international services.

Avco's president announces major missile breakthrough

A major theoretical breakthrough has been made on the 5,000-mile ICBM program, according to the Air Force Ballistic Missile Division, Air Research and Development Command, and Dr. Lloyd P. Smith, president of the Research & Development Division of Avco Manufacturing Corp.

The Avco research laboratory, by creating shock wave duplicating reentry effects has found a "shortcut" permitting nose cone design to go ahead rapidly before actual flight test information is available. Prototypes of the nose cone have been constructed.



FIRST FLIGHT view of Saunders-Roe mixed-power, single-seat research interceptor.

MATS gets first Douglas C-133; 39 reported on order

DOUGLAS C-133A turboprop cargo transport can carry tonnage equivalent to 20 loaded freight cars from Los Angeles to New York.

Military Air Transport Service has received its first Douglas C-133 turboprop transport—world's largest cargo airplane—and will take delivery of the second within a month.

MATS' first C-133 was delivered to its Atlantic Division at Dover Air Force Base, Del. The aircraft, ninth off the production line, will undergo phase VII (employment and suitability) testing at Dover. It is expected to make its first transatlantic hop in about a month.

The first MATS C-133 was christened "The State of Delaware" by Mrs. J. Caleb Boggs, wife of Delaware's governor.

Future planning calls for a squadron equipped with the $3.5-million cargo aircraft. Five existing heavy transport squadrons are equipped with Douglas C-124s at Dover. Thirty-nine C-133s are reported on order for MATS.

Two C-133As are capable of handling the same tonnage as five C-124s. Powered by four Pratt & Whitney T34 engines, the aircraft has a span of 179 ft. 8 in., length of 157 ft. 6 in. and tail height of 48 ft. It can carry a 41,700-lb. payload 3,500 nautical miles or nearly 100,000 lbs. more than 1,000 nautical miles.

Air Cargo, Inc. foresees improvement in condition

Air Cargo, Inc., a ground-service adjunct of the domestic scheduled airlines, expects to improve its financial position in the next few years although operations for the past 10 years show a deficit of $348,906 and six of the 10 years have shown losses.

In making the organization's first public report on operations, Emery F. Johnson, president, contrasts the first five year's loss of $353,007 with the past five year's profit of $4,101. Johnson said a "perfect year's service" would result in a profit of $1 since the corporation is a service organization rather than a profit-making one.

Fairchild releases F-27 delivery schedule

Fairchild has released a revised delivery schedule for the F-27 Friendship. Mackey Airlines, which was to have received the first F-27, will take delivery of its first model in August 1958. Fairchild explains that this is in line with an original request of Mackey to get its first Friendship at the outset of its heaviest seasonal traffic period.

Latest schedule is:

West Coast Airlines—to get 6, March through October 1958.

Piedmont Airlines—12, April through October 1958.

Bonanza Air Lines—3, May through June 1958.

Quebecair—2, June, July 1958.

Avensa (Aerovias Venezolanas, S.A.)—5, July 1958 through January 1959.

Mackey Airlines—2, August, September 1958.

Northern Consolidated Airlines—3, October 1958 through April 1959.

Southwest Airways—3, September, October 1958.

AREA (Ecuador)—1, November 1958.

Wien Alaska Airlines—3, February through April 1959.

Wheeler Air Lines—2, February, March 1959.

Delivery of the executive version to corporations will begin in December 1958. Fourteen corporations have placed orders but only those by Continental Can, General Tire, Butler Aviation and Bank of Mexico have been announced.

Slick to retire C-46s

Slick Airways has completed arrangements to retire its fleet of C-46 aircraft after 12 years of service. The airline has sold its 13 C-46s to AAXICO Airlines, Inc., of Miami, subject to CAB approval. Slick will lease back 10 of them for a year and six for another year.

BEA orders 6 Comet 4Bs

British European Airways has ordered six Comet 4Bs for delivery in 1959, in time for use on BEA's routes in 1960. The aircraft will carry 100 passengers.

The Comet 4B is capable of flying stages up to 2,000 miles, cruising up to 545 mph. It has a slightly shorter span and longer fuselage than the Comet 4. British Overseas Airways Corp. has ordered 19 Comet 4s for delivery starting next year.

Air Force to deactivate 7 bases, 5 flying units

Air Force has announced plans to deactivate seven facilities, two Tactical Air Command wings and three Air Defense Command fighter interceptor squadrons.

The two TAC wings, operating out of Foster AFB, Texas, and three ADC squadrons, operating out of McGhee-Tyson Airport, Tenn., and Minneapolis-St. Paul International Airport, will be wiped out in the spring.

Schedule for deactivating bases and other facilities is: Foster AFB, Texas, third quarter fiscal 1958; Wendover AFB, Utah, second quarter fiscal 1958; Ardmore AFT, Oklahoma, first quarter 1959; Savannah Storage Station, Ga., second quarter 1959; Cheli Air Force Depot, Calif., fourth quarter 1960; Philadelphia Storage Station, Pa., fourth quarter 1959; Reading Storage Station, Pa., 1958.

Aero Design resumes operations after fire

Aero Design & Engineering Co. has announced that it is conducting "business as usual" following the destruction of one of its production facilities by fire. President R. T. Amis, Jr., said there will be no interruption in the operations of the company or in the supply of parts to customers.

The company had 50 new Aero Commanders in its pipeline and modification facilities which were undamaged. These will be delivered to distributors.

Production activities will be established immediately in the company's new facility at Tulakes Airport, Bethany, Okla. This plant is in the final stages of completion, Amis said, and is about three times the size of the plant that was destroyed.

TWA plans $12-million jet overhaul base

Trans World Airlines has revealed plans to build a $12-million jet engine overhaul base at Kansas City.

The building and test cells will be built with company money. Completion is slated by late 1958. The building will be about the same size as the present piston-engine overhaul facility which is two stories high and 350 ft. by 390 ft.

Soviet scientists at WESCON show outline Russian views on latest electronics technology

Participation by three Russian scientists in a special technical session at the Western Electronics Show and Convention set a precedent for Institute of Radio Engineers meetings and gave new clues to Soviet thinking in electronics technology.

The three are members of a party of 16 Russian scientists and engineers that came to the U.S. to attend the 12th general convention of the International Scientific Union scheduled to meet at Boulder, Colo., this month.

Presence of the Russians at WESCON was the result of a general invitation to all international participants in the Boulder conference, which was accepted by the delegates who are members of the Academy of Sciences of the Soviet Union.

Although completely unprepared to deliver papers before WESCON when they arrived in San Francisco, three members of the delegation agreed to do so, and with only three days lead-time prepared papers which they delivered, complete with slides, before a special technical session arranged for them.

Participating were V. Krassilnikov, V. I. Siforov and A. M. Prochorov who gave talks in English on subjects of important current interest to the U.S. electronics industry.

Krassilnikov, identified as a specialist on radio propagation and ultrasonics, talked on the propagation of ultrasonic power in liquids. He explained that work with large amplitude waves in such media falls in the field of pure science.

The control and measurement of such power, Krassilnikov said, has great importance in industrial engineering, drilling operations, etc. and his discussion revealed the Soviets have been giving close attention to basic investigations of the behavior of ultrasonic energy in various media, particularly very high power effects.

Siforov, specialist on information theory and radio reception, talked on the effects of random phase and amplitude changes on the capacity of communication channels. He appraised the effects of such changes on relative capacity of such channels from a mathematical viewpoint. Information of this nature could be closely related to current high interest in the U.S. in single-sideband systems for civil and military aviation communications systems.

Greatest interest by the large audience which turned out to hear the Russians was shown in Prochorov's talk on the MASER (Microwave Amplification by Stimulated Emission of Radiation). Prochorov is a specialist on radio propagation and ultrasonics.

The term MASER is being applied to new solid-state types of amplifiers that promise great gains in radar, countermeasures and communication and are characterized by extremely low noise. They usually operate at very low temperatures near absolute zero. The new atomic amplifiers are much less complex than traveling wave or klystron tubes and use the electron spin within the atom of a solid itself for operation.

Another type of MASER using gas, and similar to the original one first demonstrated by Dr. Charles H. Townes, Columbia University, in 1954, is characterized by extremely high stability when used as an oscillator and has been reported to have stability greater than one part in 10^{10}, which makes it attractive for use as a clock in navigation and other devices requiring an ultra-accurate reference source.

Prochorov discussed the gas MASER and noted that stability is 10^{13} to 10^{14}, which would appear to surpass U.S. results thus far reported.

One comment by Properov which drew considerable attention was that stability was so high it might be used to detect frequency changes due to gravity effects.

When questioned on whether this effect had been demonstrated in Russia by centrifuge or balloon-lifted devices, Properov said the tuning problem was quite critical and until this was overcome gravity detection must be delayed.

Harold Gatty dies at 54; circled globe in 1931

Harold Gatty, 54, president of Fiji Airways and special representative for Pan American World Airways in the South Pacific, died last week at Suva, Fiji Islands.

Gatty, veteran aerial navigator who circled the world in 1931 with Wiley Post, had lived in the Fiji Islands since World War II. During the war he served in the Army Air Corps in the South Pacific.

In 1932 Gatty was appointed senior aerial navigator engineer for the Army Air Corps.

First U.S. utility jet completed by Lockheed

FIRST TO ROLL OUT a prototype in Air Force's off-the-shelf jet utility aircraft competition was Lockheed with its twin-engine version of the CL-239. Plane was scheduled to fly late last week. Prototype has two Bristol Orpheus jets, but production versions will have four engines—either GE J85s or Fairchild J83s. Named the JetStar, prototype was completed in 30 weeks. Performance calls for 500 mph at 40,000 ft., with 10 passengers and crew of two.

BOEING's 707 *Jet Stratoliner*, to fly on major routes of leading world airlines, is one of more than fifty types of turbine-powered aircraft using Hamilton Standard equipment. Superior engineering, research, and development, and years of experience stand behind Hamilton Standard's leadership in production for outstanding aircraft—jet or propeller driven.

WHEREVER MAN FLIES

HAMILTON STANDARD

Propellers * Starters * Air Conditioning Systems * Fuel Controls * Valves * Pumps

HAMILTON STANDARD, WINDSOR LOCKS, CONNECTICUT

NEW MEMBER OF A FAMOUS FAMILY...

July, 1957
AIR CARGO
Magazine and Official Guide
the GOLDEN ROCKET . . .
Air Express Overnight to Europe
here today . . . .
. . . delivered tomorrow!
AIR EXPRESS INTERNATIONAL CORP.

AIR CARGO Magazine and OFFICIAL GUIDE—companion to OFFICIAL AIRLINE GUIDE

During the past ten years the air cargo market has grown from 142 million ton miles to 717 million ton miles. This rapid growth has created a demand for an up-to-date air cargo magazine and guide . . . .

AIR CARGO ANSWERS THAT DEMAND

The Guide Section lists all the air cargo flights of the world's airlines and is brought up to date monthly. Also includes many pertinent references such as international commodity rates, conversion tables, facts about Air Express, Air Parcel Post and others.

The Magazine Section gives complete coverage of air cargo news including features, trade trends and new products.

WHO USES AIR CARGO?

Over 9,000 executives in industrial firms, airlines, air freight and express forwarders. Exporters and importers, brokers, traffic executives, freight traffic associations, bus and rail lines, government, military, chambers of commerce, general sales managers and others also read and use Air Cargo. All will see your message in the guide *time and time again!*

REACH AND INFLUENCE THE AIR SHIPPING MARKET THROUGH AIR CARGO

It's the only publication of its kind in the world

OTHER AMERICAN AVIATION PUBLICATIONS

American Aviation Magazine, Missiles and Rockets, Aviation Daily, World Aviation Directory, Aircraft Yearbook, Aviation Facts and Figures, Airports, Who's Who in World Aviation, Air Traffic News, Air Information Division, Armed Forces Management, Official Airline Guide

ADVERTISING OFFICES:

NEW YORK: 17 East 48th Street — PLaza 3-1100
CHICAGO: 139 N. Clark Street — CEntral 6-5804
CLEVELAND: 1422 Euclid Avenue — PRospect 1-2420
DETROIT: 201 Stephenson Bldg. — TRinity 5-2555
WEST COAST: 8943 Wilshire Blvd., Beverly Hills, Cal. — CRestview 6-6605
MIAMI: International City, 4471 36th Street, N.W. —
CANADA: Allin Associates, 12 Richmond Street, East Toronto — EMpire 4-2001
Allin Associates, 1487 Mountain Street, Montreal — HArbour 6898
LONDON: The AAP Company, 17 Drayton Road, Boreham Wood, Hertfordshire, England, Cable Address — STEVAIR, London
PARIS: 11 Rue Condorcet, Paris (9e), France — TRU 15-39

AMERICAN AVIATION PUBLICATIONS | EXECUTIVE OFFICES: 1001 VERMONT AVENUE, N.W., WASHINGTON 5, D.C.

The senator was mad

The Alaska airline certification bill got awfully hot at one point, so hot that some telephone wires in Washington sizzled. Seems that a Washington newspaper wrote an editorial strongly opposing passage of the bill and made quite a personal attack on Sen. Warren Magnuson, D., Wash., who was pushing the bill.

The Senator got hold of an early edition, notified the editor that the editorial references to him had better be pulled out of the next edition—or else. The paper did so, probably saving itself a libel suit.

But the Senator didn't stop there—he also made the phone wires sizzle in a few other directions, notably an airline he accused of inspiring the editorial. It was plenty hot while it lasted.

Wilson's latest quip

Newspaper accounts of the alleged first firing of a mail-carrying rocket by the Army cannot be either confirmed or denied because of a Defense order forbidding discussion of any missile firings at Patrick AFB.

Questioned on the veracity of the report at his news conference, Defense Secretary Wilson quipped that it "sounded like a funny way for a man to write himself a letter."

According to the reports, the Army launched a Jupiter vehicle which ejected a special container carrying a letter addressed to General Medaris, head of the Ballistic Missile Agency.

Neat promotion trick

One of the neatest promotion tricks seen in a long time was Lockheed's delivery announcement of the *Palos de Moguer* (Trees of Moguer), a 1049G Super Constellation destined for Spain's Iberia Airlines. Dated for release Thursday, August 15, the Lockheed story hit at the same time the August issue of *Life* was put on the news stands, carrying a 10-page, four-color picture story on the village of Moguer in southeast Spain! Whether this was unintentional or the fine work of Lockheed's capable B. W. Holloway remains unrevealed.

Pilot with a record

Capt. R. L. Wagner of United has retired at 60 with a record of never having scratched the paint on an airplane. As Rem Thigpen of UAL said, "That's a record you can't beat—you can't beat perfect."

Larry Fritz, ex-AA vp-operations showed up to give Wagner a citation from Flight Safety Foundation and the P.O. gave him a merit citation, said to be the first ever given to other than a postoffice employe. UAL has named an airplane after him and given him the company's first set of 30-year wings, a little bigger with a diamond set in.

Just wondering, that's all

Each Lockheed Super Constellation, we are told, requires 103,000 manufactured parts. Wonder who counted them.

Little known facts

In 1948, the Navy asked Douglas-El Segundo to bid in a blimp competition as there was only one other bidder in the field. Douglas received a rude jolt a few months later when told it had won!

After a lot of thought as to where it could be built, El Segundo threw in the towel and turned the design over to Goodyear. Latter made some modifications, built the blimp and recently established a new and much-publicized endurance record.

Flying casket

CAB recently granted an exemption to Riddle Airlines to transport a reporter-photographer team from Chicago to San Juan and return. The pair was working on a story of the carrier's mortuary operations. The account—a technical report, not an inside story—was for "Casket and Sunnyside" magazine.

Squeaking simians

Most disconcerting experience reported by one observer at the recent Air Force Assn. convention in Washington had to do with a USAF aviation medicine display in the D. C. armory.

Display consisted of a cutaway rocket nose cone showing two disconsolate monkeys strapped in place for a ride to high altitude. Particularly jarring were the plaintive cries which appeared to come from the simians.

Closer examination showed the "cries" were coming from a rotating exhibit in the next booth which squeaked periodically as it turned.

It's strictly confidential

The record is confidential and details may never be known publicly, but the official government ruling on alleged improper activities of Eastern Air Lines and Pan American World Airways in connection with U.S.-Mexico air rights is this:

"On the basis of all the evidence of record, we conclude that neither applicant has been shown to be legally unfit within the meaning of the Act." Statement was made by CAB and endorsed by the President.

Industry talk . . .

An old-timer in aviation commented the other day: "Wonder why the Army doesn't take advantage of the aircraft test and other facilities at USAF's Wright-Patterson Field? The facilities are available. The Army needs 'em. And what better move toward liaison, maybe even sensible unification, than to have such cooperation between the two services?" Worth wondering about.

• • •

What next? Nine men and one woman were given citations for trespassing at the Los Angeles International Airport because airport patrolmen said they were letting a pack of about 20 greyhounds chase rabbits on the field. Pilots were worried that a dog might be hit.

Recognize this airplane?

FIVE-PLACE DURAMOLD F-46A, only one of which was built, is still in use for charter and taxi work at Washington Virginia Airport, Alexandria, Va. Plane was built in 1937 by Clark Aircraft Co., Hagerstown, Md., at a cost of $176,000. Company later was bought by Fairchild and name changed to Duramold Aircraft Corp. Powerplant is Pratt & Whitney R985, cruising speed 160 mph, gross weight 4,800 lbs.

To owners and operators of Pratt & Whitney Aircraft powered aircraft:

THERE'S NO SUBSTITUTE FOR DEPENDABILITY

To be certain of receiving *genuine factory parts* for your Pratt & Whitney Aircraft engine, see a factory-authorized distributor when you need engine maintenance or overhaul.

These approved distributors, located conveniently in all parts of the country, keep comprehensive stocks of factory parts, and have the facilities, skilled personnel, and up-to-date P&WA instructions to give you the best possible service.

To insure the best performance from your Pratt & Whitney Aircraft engine, see these P&WA distributors:

AIRWORK CORPORATION,
Municipal Airport, Millville, N. J.
Branches at: Newark Airport, N. J.
814 N. Main St., College Park, Ga.
5245 Northwest 36th St., Miami, Fla.
5821 Seminary Rd., Baileys Crossroads, Alexandria, Va.

NORTHWESTERN AERONAUTICAL COMPANY
Holman Field, St. Paul, Minn.

PACIFIC AIRMOTIVE CORPORATION
Burbank, Calif.
Branches at: Boeing Field, Seattle, Wash.
Oakland International Airport, Calif.
Stapleton Airfield, Denver, Colo.

SOUTHWEST AIRMOTIVE COMPANY
Love Field, Dallas, Texas

Pratt & Whitney Aircraft
Division of United Aircraft Corporation
East Hartford, Connecticut

WEST COAST TALK

by Fred S. Hunter

Why aircraft manufacturers are keenly interested in ducted fan engines; about stretchouts and cutbacks

ALLISON, Curtiss-Wright and General Electric all have been around talking to aircraft manufacturers about ducted fan engines. When will they be ready? Oh, about 1963 or '64. Are the manufacturers interested? Yep! Any time you hold forth the promise of a 15% saving in specific fuel consumption, you may be sure the aircraft manufacturers will be interested.

Question around now is whether any of the recently ordered stretchouts will be followed later on by cutbacks on the same programs. A stretchout actually isn't an economy; it's an expediency to save today's dollars even though it may cost you more tomorrow. Any factory program has to bear its share of overhead costs. Overhead on a three-year program inevitably is greater than on a two-year program. So, unless there's also a cutback in the total number of planes ordered, a stretchout means a higher cost per unit produced and a greater outlay of funds in the long run.

The Navy's crack precision acrobatic team, the "Blue Angels," better look to its laurels. Guided by Cmdr. "Zeke" Cormier, former Blue Angels squadron leader, the "Albino Angels" from Miramar Naval Air Station wowed the crowd at a recent San Diego air show with a display of tight, diamond-formation gyrations with their tiny Douglas A4D Skyhawks. Small size of the Skyhawks added appreciably to the spectacle.

About the only point on which Bell and Ryan were in agreement in VTOL papers presented at the recent National Naval Aviation Meeting in San Diego was the future use of lightweight engines. Ryan proposed a cluster of small engines for its Vertijet. Bell wants lighter engines, but didn't say how many.

How do you like this for passenger gratitude? After traveling Pan American from Honolulu to Hong Kong, a Chinese passenger bought a four-inch ad three columns wide in a Honolulu Chinese language newspaper to praise the service he had received from Joe Wong, PAA sales representative in Hong Kong.

There's a lot of smirking going on around Lockheed since North American changed its jet utility aircraft to move the engine pods to the aft fuselage similar to the installation on Lockheed's CL-329. Incidentally, in case you didn't know, the Lockheed baby jet is practically a scale model of the CL-193 jet transport which Lockheed first proposed to the airlines in 1950—including aft fuselage mounted engines.

Now they're talking about sound suppressors for piston engines. Noise-conscious Curtiss-Wright has started a project by which it hopes to lower the decibels put out by its R3350 turbo-compounds. It will be worthwhile, Roy Hurley, C-W president believes, because he expects R3350s will continue in production for eight to 10 years more despite the on-coming jets and turboprops.

Now the local service carriers are encountering airport runway problems. Bonanza Air Lines won't be able to land its new Fairchild F-27s at El Centro, Calif., one of its better feeder points, unless the Imperial County Airport's 4,400-foot runway is extended . . . and here's a reverse twist—American Airlines is converting six DC-6s back from coach to first-class configurations. They're to replace Convair 240s being sold.

Convair-San Diego is installing one of the largest cameras ever built, a $50,000 unit with reproductive accuracy up to 1/2,000th of an inch for reproduction of hyper-accurate metal templates up to a size of 5 by 12 feet . . . In a carrier landing, the Navy's F4D Skyray thumps down from 170 knots to a dead stop in 140 feet, which is, you might say, a record thump . . . Hold onto your hats, men, Cole of California is coming out with a "707" line of bathing suits. Cole of California? Oh, Mr. Rochlen.

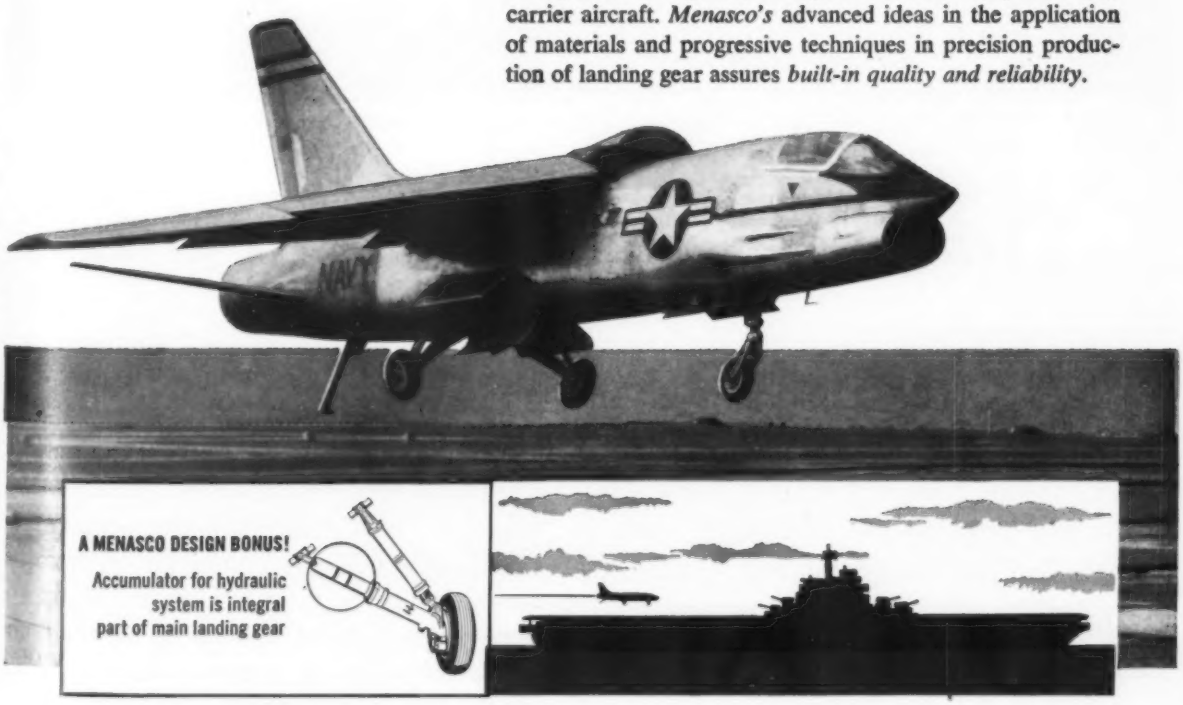
Russell J. Hilsinger, a research laboratory analyst at Ryan-Aeronautical, lives in Jacumba, Calif., and travels a roundtrip of 150 miles by automobile to and from the plant each day. Four hours driving time a day. That's almost as long as going to and from work on the Hollywood freeway.

Why CHANCE VOUGHT *Chose* menasco

...*Because* MENASCO COULD MEET THE CHALLENGE OF COMPACT, STRONGER, LIGHTER LANDING GEAR FOR HIGH SPEED NAVY AIRCRAFT

CHANCE VOUGHT record-breaking *Crusader* jet fighters require extremely rugged landing gear to operate from aircraft carriers. The designs for the main and nose gear called for great strength in order to absorb maximum sink speeds and arresting tension; the weight-saving combination of steel and aluminum; and the highest mechanical specifications.

MENASCO was chosen to fabricate the *Chance Vought Crusader* landing gear and not only *met* but *exceeded* all requirements. The gear is the lightest, strongest and most compact of any carrier aircraft. *Menasco's* advanced ideas in the application of materials and progressive techniques in precision production of landing gear assures *built-in quality and reliability.*



A MENASCO DESIGN BONUS!

Accumulator for hydraulic system is integral part of main landing gear

first in development, quality, delivery and service.

menasco manufacturing company

BURBANK, CALIFORNIA • FORT WORTH, TEXAS

SPECIALISTS IN AIRCRAFT LANDING GEAR

R.W.F. (Big Bob) Schmidt, Manager, Tucson Airport Authority

There's a team in Tucson worth knowing about!

Big Bob Schmidt and Shell, working together at Tucson, Arizona, Airport have increased aviation fuel sales fivefold since 1948!

Seems everything's big at the Tucson Airport—Big Bob, big sales . . . and big plans that are underway to extend the 12,000-foot runway to 15,000 feet, making it the longest in the world!

"One of the things that attracted us to Shell," says Bob, "was the company's reputation for helping dealers grow. We knew there must be good reasons for it. We soon found out. Giving engineering and other specialized assistance to help dealers build for the future is one secret of Shell's position as an aviation supplier.

"For example, when we needed more bulk space, Shell engineers designed and supervised the construction of storage facilities.

What's more, Shell's technical representative is always here when we need him, making our job of keeping our customers satisfied a lot easier."

And at Tucson, customers *are* satisfied. Pilots know that a Tucson stopover means a lot more than sunny weather. Big Bob gets them in and out again—fast! He delivers the kind of service they need for on-schedule take-offs every time.

Responsibilities fall on Bob Schmidt when he's *away* from the airport too. Bob is president of the National Foundation for Asthmatic Children, president of the American Association of Airport Executives, a director of the Tucson Metropolitan YMCA, and chairman of the Y's Southside Branch.

Shell is constantly on the watch for men who can build careers to match that of Bob Schmidt.

Corporate plane taxies past control tower on way to spacious parking ramps. New operations' building and ten-story tower are under construction.

Big Bob and Shell representative "Nebby" Nebeker stand near bulk storage tanks discussing plans for still further expansion of airport facilities.

Speedy turnabout service is provided for huge airliners landing at Tucson. Efficiency results in on-time take-offs.

It pays to be a Shell Aviation Dealer

—and the Shell office nearest you will be glad to show you why

SHELL

Circle No. 39 on Reader Service Card.

United Kingdom authorizes independent airlines to fly pressurized aircraft at prices lower than BOAC's

The United Kingdom has taken an important policy decision regarding the operation of low-fare "colonial coach" services by the British independent airlines. Hitherto, pressurized aircraft were not permitted to operate these services, which have fares somewhat lower than BOAC's tourist fares. Under the new policy, however, the British Air Transport Advisory Council has agreed to the use of Handley-Page Hermes or Vickers Viscount aircraft on colonial coach services to Nairobi and Salisbury of Airwork and Hunting-Clan.

The use of these aircraft is to be permitted subject to their being equipped with maximum-density seating. Furthermore, the present frequency is to be slightly reduced in order to take account of the new aircrafts' greater capacity.

It has also been proposed by ATAC that Airwork and Hunting-Clan should be allowed to operate tourist class services to Accra by way of a west coast route through Bathurst and Freetown with no restriction on aircraft types but maintaining the present frequency. Such operations would be at current IATA tourist fares. ATAC proposed this change since, now that Ghana has become an independent member of the Britsh Commonwealth, it is no longer possible for the colonial coach services to be operated to Accra.

Regarding services from England to the Mediterranean area, ATAC recommended there should be no change from the present set-up but that colonial coach service to Cyprus and to Gibraltar should be reviewed in the light of experience of the interim arrangements on the other routes.

For the period after the introduction of the new low-fare tourist services, ATAC recommended that on the existing routes to Nairobi, Salisbury and Accra, Airwork and Hunting-Clan should be allowed to provide this type of service instead of colonial coach on the basis of BOAC having 70% and Hunting-Clan and Airwork together having 30% of the United Kingdom's share of capacity needed for these services. BOAC should continue to cater to the United Kingdom's share of the higher classes of traffic on the route.

The government's decision to allow British-owned independent operators to use Viscount and Hermes aircraft on coach class service to Southern Africa came as a surprise to Central African Airways, which was recently refused permission to use unpressurized DC-4s on this type of service. Since this presumably means that Central African Airways will be entitled to the same facilities, R. P. Hartley, that line's secretary, immediately flew to London to make application to use Viscounts on coach class service.

Employment declines to 902,400 in May

Employment in the aircraft and parts industry dropped from 909,100 in April of this year to 902,400 in May. This is still substantially above the 783,700 employed in May 1956.

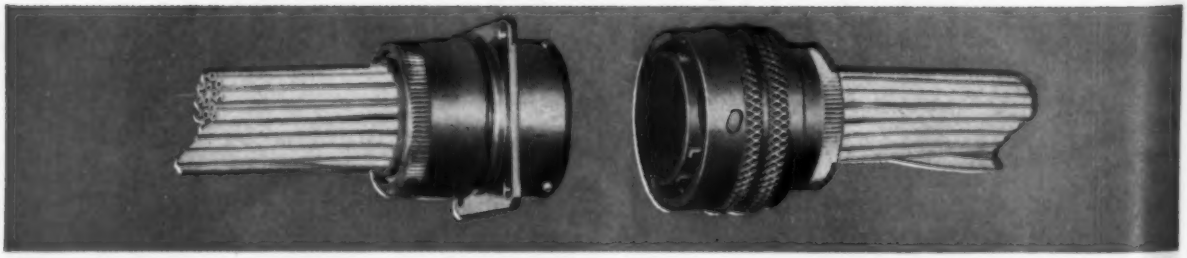
Average weekly pay for the comparative periods remained about the same, $94.83 this year and $94.69 a year ago when the average work week was 41.9 compared with 40.7 this year.

Vanguard project to cost $110 million

Vanguard satellite launching and tracking project can be completed this fiscal year at a total cost to the government of $110 million, according to Navy. This is about three times the original estimates of the project's cost.

Total pricetag includes $96,126,000 to be spent by Navy and $13,874,000 by the National Academy of Sciences, Air Force and other agencies.

Bendix "PT" PYGMY ELECTRICAL CONNECTOR WITH 5-KEY POLARIZATION, 3-POINT LOCK



Positive locking feature eliminates safety wiring

The new Bendix* "PT" connector represents the greatest advance yet achieved in miniature connector design. It incorporates more exclusive features than any miniature connector on the market. Here are a few of the things that make the Bendix "PT" outstanding in the connector field today:

- Safety wiring completely eliminated
- Mechanically assisted coupling and uncoupling through cam action
- Visual and audible inspection of coupling—perfect for "blind" locations
- Three-point bayonet lock; perfect axial alignment of mating parts at all times
- Constant spring tension behind mated insert faces
- Five key polarization—positive protection against mismating or cross-plugging
- Resilient inserts, performance-proved in millions of Bendix connectors over the past ten years
- Heavy gold plating over silver on all contacts
- Closed entry, probe-proof socket contacts
- Both pin and socket contacts machined from high-grade copper alloy
- Machined bar stock or impact-extruded shell components cadmium-plated to QQP-416; olive drab iridite after treatment

"PT" connectors accommodate about three times as many circuits, size for size, as comparable "AN" connectors. Like so many Bendix products, they are a result of the traditional Bendix policy of anticipating the needs of the aviation industry, in this case the trend to higher voltages and smaller conductors.

*Trademark

Bendix SCINTILLA DIVISION of Bendix AVIATION CORPORATION
SIDNEY, NEW YORK

Export Sales and Service: Bendix International Division, 205 East 42nd St., New York 17, N. Y.

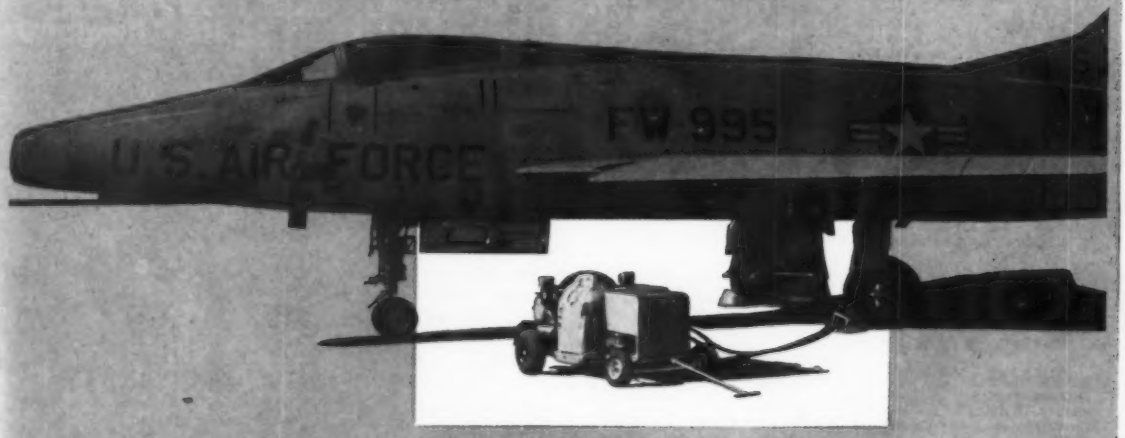
FACTORY BRANCH OFFICES:
117 E. Providencia Ave., Burbank, Calif. • Paterson Building, 18038 Mack Ave., Detroit 24, Mich. • 545 Cedar Lane, Teaneck, N. J. • 5906 North Port Washington Rd., Milwaukee 17, Wisc. Hulman Building, 120 W. Second St., Dayton 2, Ohio • 2608 Inwood Road, Dallas 19, Texas • 8425 First Ave., South, Seattle 8, Washington • 1701 "K" Street, N.W., Washington 6, D. C.

VICKERS DEMONSTRATES NEW HYDRAULIC STARTER PACKAGE

As a part of its jet engine hydraulic starting system evaluation program, Vickers Incorporated recently demonstrated the ability of its starter package to start Century Series fighters. Acceleration to ground idle speed of the J-57 turbojet engine, installed in a production North American F-100D Super Sabre, was accomplished in times comparable to other known starting means... using only 50 horsepower, prime mover power.

Consisting basically of production Vickers aircraft hydraulic components... performance-proven on almost all existing U.S. military and commercial aircraft... the Vickers starting system offers substantial savings in weight, size, and cost — both initial and maintenance — over other known means. Available as either a ground mobile unit or an aircraft-installed airborne version, the Vickers starter package is capable of dual function. After engine starting, the hydraulic starter motor can serve as an engine-driven pump for aircraft auxiliary power requirements in the airborne version.

For further information regarding Vickers hydraulic starting systems, write for illustrated brochure SE-94a. Also, your nearest Vickers representative can show you the many system combinations available to meet your specific needs.



VICKERS INCORPORATED

DIVISION OF SPERRY RAND CORPORATION

Aero Hydraulics Division
Engineering, Sales and Service Offices:

Administrative & Engineering Center	3201 Lomita Blvd.
Detroit 32, Michigan	P.O. Box 2003 Torrance, California

District Sales and Service Offices:
Albertson, Long Island, N. Y., 882 Willis Ave. • Arlington, Texas, P. O. Box 213 • Seattle 4, Washington, 623 8th Ave. South • Washington 5, D.C., 624-7 Wyatt Bldg. • *Additional Service facilities:* Miami Springs, Florida, 641 De Soto Drive

TELEGRAMS: Vickers WUX Detroit • TELETYPE: "ROY" 1149 • CABLE: Videt

OVERSEAS REPRESENTATIVE:
The Sperry Gyroscope Co., Ltd.— Great West Road, Brentford, Middx., England

7863

ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

Circle No. 41 on Reader Service Card.

Summary of airline revenues, expenses for 2nd quarter, 1957 vs. 2nd quarter, 1956

Compiled by American Aviation Publications from Official C.A.B. Data.

Airlines	Total Operating Revenues 1957	Total Operating Revenues 1956	% Change	Passenger Revenues 1957	Passenger Revenues 1956	% Change	Total Operating Expenses 1957	Total Operating Expenses 1956	% Change	Net Operating Income 1957	Net Operating Income 1956	% Change
DOMESTIC												
American	$ 79,848,397	$ 74,815,481	6.7	$ 71,578,035	$ 67,904,007	5.4	$ 70,689,146	$ 60,977,886	15.9	$ 9,159,248	$13,837,595	—33.8
Braniff	13,819,441	11,784,471	17.3	12,794,224	10,849,196	17.9	12,600,194	10,418,642	20.9	1,219,247	1,365,829	—10.7
Capital	24,899,858	16,284,217	52.9	23,591,895	15,299,743	54.2	23,202,675	15,742,997	47.4	1,697,183	541,220	213.6
Continental	5,591,726	4,647,388	20.3	5,167,258	4,047,399	27.7	5,447,728	4,269,420	27.6	143,998	377,968	—61.9
Delta*	19,941,566	17,433,026	14.4	18,325,809	15,938,395	15.1	17,732,887	14,987,681	18.3	2,208,679	2,445,345	—9.7
Eastern	62,889,700	53,653,406	17.2	58,998,419	50,472,684	16.9	60,215,255	45,702,311	31.8	2,674,445	7,951,095	—66.4
National	NA	13,387,388	....	NA	12,106,671	....	NA	10,670,736	....	NA	2,716,652	....
Northeast	3,474,243	2,513,230	38.2	2,910,886	2,023,228	43.9	4,115,224	2,516,096	63.6	—640,981	—2,866	....
Northwest	14,283,342	13,411,368	6.5	12,685,292	12,062,484	5.2	13,443,124	12,409,495	8.3	840,218	1,001,873	84.7
Trans World	50,218,551	44,663,575	12.4	45,624,227	41,125,317	10.9	47,758,493	44,839,622	6.5	2,460,058	—176,047	....
United	69,344,044	65,704,006	5.5	61,770,953	58,575,344	5.5	64,481,512	56,901,191	13.3	4,862,532	8,802,815	—44.8
Western	10,280,679	7,964,571	29.1	9,546,129	7,435,749	28.4	8,812,895	6,855,020	28.6	1,467,783	1,109,551	32.3
TOTALS	$354,591,537	$326,226,127	8.7	$322,993,127	$297,842,217	8.4	$328,499,133	$286,291,097	14.7	$26,092,410	$39,971,030	—34.7
* 1957 Figures Preliminary												
INTERNATIONAL												
American	$ 1,454,737	$ 1,304,481	11.5	$ 1,178,187	$ 1,035,415	13.8	$ 1,419,645	$ 1,180,206	20.3	$ 35,092	$ 124,275	—71.7
Braniff	2,217,089	1,781,802	24.4	1,690,215	1,283,355	31.7	1,931,587	1,650,306	17.0	285,502	131,496	117.1
Delta	NA	1,251,554	....	NA	1,154,349	....	NA	1,172,521	....	NA	79,033	....
Eastern (San Juan)	4,021,519	3,551,268	29.6	3,623,792	3,120,874	33.0	2,218,017	2,661,218	35.4	803,502	890,050	12.2
Bermuda	580,483			527,141			385,679			195,164		
National	NA	997,407	....	NA	923,900	....	NA	960,399	....	NA	37,008	....
Northwest	7,296,998	6,364,931	14.6	4,716,991	3,880,135	21.6	6,139,086	5,838,428	5.1	1,157,912	526,503	119.9
Panagra	4,970,495	4,740,988	4.8	3,657,845	3,447,164	6.1	4,910,899	4,451,357	10.3	59,596	289,631	—79.4
Pan American												
Lat. American	22,842,712	21,322,307	7.1	17,254,418	14,932,794	15.5	23,907,912	20,981,385	13.9	—1,065,200	340,922	——
Atlantic	36,698,147	31,477,833	16.6	29,816,743	25,350,831	17.6	30,926,244	27,131,270	14.1	5,771,903	4,346,563	32.8
Pacific	20,642,899	17,663,829	16.9	14,550,930	13,027,083	11.7	18,900,131	15,445,132	22.4	1,742,768	2,218,697	—21.5
Alaska	1,559,640	2,051,639	—24.1	1,207,461	1,131,580	6.7	1,984,788	1,864,385	6.5	—425,148	187,254	....
Trans World	17,203,285	18,948,491	—9.2	13,734,811	15,396,680	—10.8	15,622,417	18,001,461	—13.2	1,580,868	947,030	66.9
United	3,435,444	3,742,794	—8.2	3,228,718	3,472,359	—7.0	2,895,999	2,736,354	5.8	539,445	1,006,440	—46.4
TOTALS	$122,923,808	$115,199,324	6.7	$95,186,252	$88,156,519	8.1	$112,242,404	$105,074,422	7.8	$10,681,404	$11,124,902	—4.1
LOCAL SERVICE												
Allegheny	$ 2,129,728	$ 1,691,345	25.9	$ 1,365,079	$ 1,200,335	13.7	$ 2,061,335	$ 1,762,793	16.9	$ 68,393	$—71,448	....
Bonanza	809,945	943,888	—14.2	472,956	426,726	10.8	823,591	739,343	11.4	—13,646	204,545	....
Central	1,085,018	833,498	30.2	380,014	299,326	27.1	1,023,457	823,222	24.3	61,560	10,276	499.1
Frontier	1,593,278	1,492,814	6.7	836,873	740,442	13.0	1,659,783	1,442,944	15.0	—66,505	49,870	....
Lake Central	825,367	707,293	16.6	409,632	356,556	14.9	862,395	664,258	29.8	—37,028	43,035	....
Mohawk	NA	1,420,917	....	NA	1,180,970	....	NA	1,412,400	....	NA	8,517	....
No. Central	2,418,558	1,987,605	21.7	1,080,089	1,593,553	—32.2	2,591,947	1,942,117	33.5	—173,389	45,488	....
Ozark*	2,108,998	1,588,903	32.7	1,085,622	821,916	32.1	1,899,767	1,394,800	36.2	209,231	194,103	7.8
Piedmont	2,175,176	1,784,115	21.9	1,408,277	1,298,303	8.5	2,073,489	1,902,695	9.1	101,687	—118,580	....
Southern	1,142,654	942,464	21.2	586,351	496,124	18.2	1,119,357	972,957	15.0	23,297	—30,493	....
Southwest	1,530,292	1,103,602	38.7	1,000,913	763,947	31.0	1,486,573	1,206,441	23.2	43,719	—102,839	....
Trans-Texas	1,697,413	1,401,201	21.1	851,734	752,991	13.1	1,675,143	1,425,696	17.5	22,270	—24,495	....
West Coast	1,102,525	999,836	10.3	657,370	561,394	17.1	1,091,809	969,382	12.6	10,716	30,454	—64.8
TOTALS	$18,618,952	$16,897,481	10.2	$10,134,910	$10,492,583	—3.4	$18,368,646	$16,659,048	10.3	$ 250,305	$ 238,433	5.1
* Preliminary												
HELICOPTER												
Chi Helicopter	$ 317,973	$ 136,718	132.6	$ 56,825	.....	....	$ 310,590	$ 139,291	122.9	$ 7,383	$ —2,573	....
Los Angeles Air	331,480	254,723	30.1	45,925	23,585	94.7	290,726	274,182	6.0	40,754	—19,459	....
N. Y. Airways	509,956	415,004	22.9	145,371	79,725	82.3	633,781	431,215	47.0	—123,825	—16,211	....
TERRITORIAL												
Caribair	$ 482,187	$ 381,681	26.3	$ 438,622	$ 344,409	27.4	$ 409,032	$ 337,829	21.1	$ 73,155	$ 43,852	66.8
Hawaiian	1,488,345	1,404,213	6.0	1,177,246	1,063,567	10.7	1,391,924	1,299,213	7.1	96,421	105,000	—8.2
Trans-Pac.	623,371	548,688	13.6	551,525	487,780	13.1	606,391	551,469	10.1	16,980	—2,783	....
ALASKAN												
Alaska (Intra)	$ 927,012	$ 1,621,544	—15.1	$ 320,156	$ 437,799	—7.5	$ 991,886	$ 1,485,550	—3.9	$—64,874	$ 135,994	....
States-Alaska	450,039			84,962			435,585			14,454		
Alaska Coastal	379,354	342,368	10.8	191,724	163,523	17.2	309,215	289,799	6.7	70,139	52,569	33.4
Cordova	499,581	228,812	118.3	33,608	32,712	2.7	457,431	228,124	100.5	42,150	689	....
Ellis	279,278	151,642	84.2	159,298	65,588	42.9	244,112	203,677	19.9	35,165	—52,035	....
No. Consolidated	588,018	635,743	—7.5	211,978	92,932	128.1	531,249	633,521	—16.1	56,769	2,222	....
Pacific Northern	2,495,890	1,458,785	71.1	1,639,042	756,823	116.6	2,279,143	1,929,638	18.1	216,747	—470,853	....
Reeve	394,371	160,086	146.3	231,931	28,206	722.3	289,612	175,861	64.7	104,759	—15,774	....
Wien	927,409	1,115,994	—16.9	177,421	112,378	59.7	1,031,267	1,043,156	—1.1	—103,858	72,837	....
TOTALS	$ 6,940,952	$ 5,714,974	21.5	$ 3,050,120	$ 1,689,961	80.5	$ 6,569,500	$ 5,989,326	9.7	$ 371,451	$—274,351	....

Transport Changes

Stanley N. Gulick appointed asst. New York area mgr. of Northeast Airlines.

Jose Marcelo Rubinstein named dist. sales mgr. for Braniff International Airways in Bogota, Colombia.

Richard C. Welch appointed sales mgr. for Northwest Airlines in Hawaii; **Morley F. Emerson,** formerly European sales dir., named Chicago dist. sales mgr.

William F. Ermer named Detroit station mgr. for Riddle Airlines.

Chikao Endo named asst. mgr. of Japan Air Lines' San Francisco office.

Alfred B. Pearson joined Iranian Airways as a specialist in supplying foreign airlines.

Herbert L. Garrison appointed Philadelphia dist. sales mgr. for Riddle Airlines.

John Simmons promoted to admin. asst.-sales, western div. of Delta Air Lines; **Charles M. Mashburn** promoted to admin. asst.-sales, eastern div., **William Martinez** named asst. mgr. of reservations for the system.

Kostas J. Boudouris will be in charge of Air France's new Denver office; **Mario J. Rondina** named mgr. of Seattle office.

Jacob W. Wiiki named mgr. of Mohawk airlines station, Willow Run Airport, Detroit.

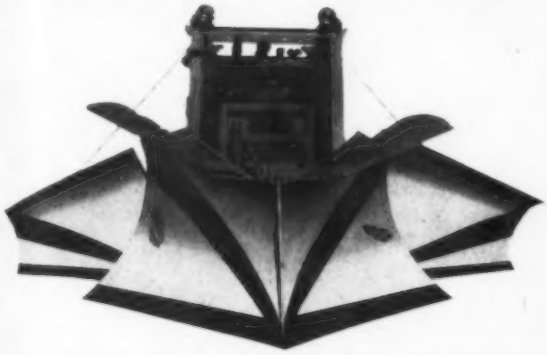
C. R. Geikie named sales mgr. for Qantas Empire Airways for North America, with headquarters in San Francisco.

H. J. Bingham appointed mgr. for British Overseas Airways Corp. in San Francisco; **Lt. Col. T. Henry Borland** named asst. to dist. sales mgr. in New York; **Charles F. Schutze** appointed cargo sales officer, New York.

WAUSAU 3-WAY

Clear Snow from Runways

- QUICKLY
- EASILY
- ECONOMICALLY



Tested for two seasons by the U. S. Air Force.

The 3-Way embodies the first major snow plow improvements in years . . . • The ability to plow high-speed either right or left, or as a Vee plow by positive hydraulic control from the truck cab. • The ability to adjust the top of the snow plow to suit the varying snow conditions through hydraulic control from the cab. • The result is unheard-of performance in clearing a runway quickly and down to the pavement.

WAUSAU *Truckgrader* ICE BLADE

Designed to remove hard packed snow and ice from streets and runways. Mounts on same truck with the 3-way snow plow to combat ice conditions. Full cab control to reverse, tilt and rotation of ice blade for best results.

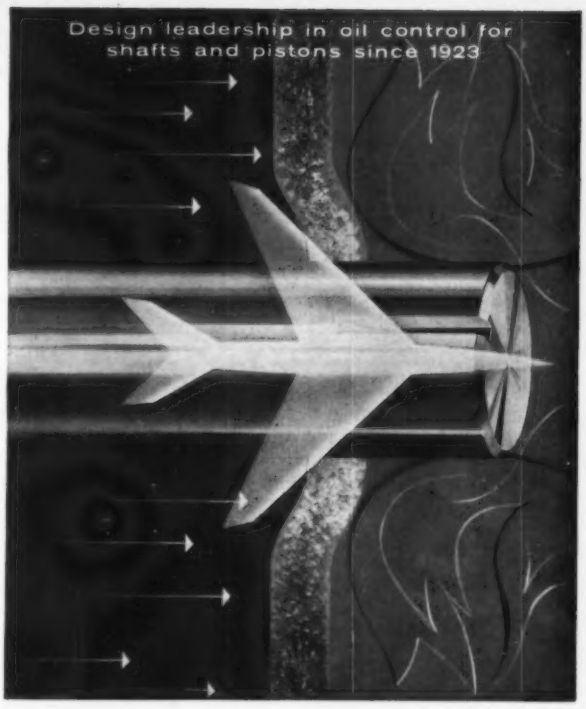
Write us for the name of your nearest WAUSAU Distributer. . . and for full information on the complete line of WAUSAU maintenance equipment, snow plows and wings, truck patrol ice planer and material spreaders.

WAUSAU IRON WORKS WAUSAU, WISCONSIN

Pioneer Snow Plow Builders

Truck Patrol Ice Planer and Material Spreaders

Circle No. 42 on Reader Service Card.



HIGH TEMPERATURE

shaft sealing problems?

...solve them with SIMPLEX

High temperatures and high speeds call for a high degree of cooperation in shaft seal design.

SIMPLEX offers this cooperation in design, backed by wide experience in solving similar problems for leading manufacturers of aircraft engines and auxiliaries. SIMPLEX products are supplied as original equipment in Allison, Pratt & Whitney, Wright and other leading aircraft engines.

If the problem involves shaft seals or piston rings, whether for jet or reciprocating engines or components, call for the specialized help that SIMPLEX engineers can offer. Call, wire or write.

Simplex Piston Ring Mfg. Co.

12301 BENNINGTON AVENUE • CLEVELAND 11, OHIO

75 N. E. 74th STREET • MIAMI 38, FLORIDA

SIMPLEX

HIGH SPEED SHAFT SEALS AND PISTON RINGS

Circle No. 43 on Reader Service Card.

PEOPLE

Top brass of Capital Airlines: Maj. Gen. David H. Baker (USAF ret.), left, recently elected president and chief executive officer of Capital, and the airline's chairman of the board, J. H. Carmichael. Baker succeeded Carmichael when latter moved up to board chairman. →

Dr. George Valley (right), new chief scientist of USAF, and Dr. Courtland Perkins (center), his predecessor, are shown on a recent visit to Hiller Helicopters. At left is Robert Wagner, Hiller chief engineer. The Air Force scientists were given a briefing on the copter company's various VTOL projects.

←

TIPTON

GURNEY

KELLY

DRINKWATER

BROODER

MARKMAN

Western Air Lines' pre-inaugural flight to Mexico City July 11 attracted many aviation dignitaries, some of whom are shown here in candid photographs made by Wayne W. Parrish, AMERICAN AVIATION's Editor and Publisher. From left: Stuart G. Tipton, president of Air Transport Assn.; Chan Gurney, Member of Civil Aeronautics Board; Arthur F. Kelly, Western vp-sales; T. C. Drinkwater, WAL president; G. G. Brooder, Western vp, and Paul Markman, head of West Coast office of Batten, Barton, Durstine and Osborn advertising agency.

DRISCOLL

MILLER

STEINHOFF

McCRUM

HYND

ISRAEL

MANUFACTURING

Name	New Position	Former Position
Donald L. Driscoll	VP-contracts and sales, Transval Engrg. Corp.	With Hughes Aircraft Co.
Leland W. Miller	VP-finance, Transocean Corp. of Calif.	Budget and fiscal officer, USAF
Dr. Ernst A. Steinhoff	Dir., Air Force missiles dept., Aerophysics Development Corp.	Tech. dir., Holloman Air Development Center
Kenneth W. McCrum	VP, SPACE Corp.	Dir., R&D laboratories
Harold Hynd	Gen. mgr. Douglas-El Segundo Div.	VP-gen. mgr., Tulsa Div.
Gordon Israel	Chief engr., PacAero Engrg. Corp.	Industry consultant
Eric B. Moss	Dir. engrg., Canadian Applied Research Ltd.	Tech. dir., Smiths Aircraft Instruments Ltd.
Roger W. Hutchins	Exec. asst. to operating head, Canadian Hunting companies	Aircraft sales mgr., Field Aviation Co. Ltd.
M. E. Dedrick	Corporate sec'y, Canadian Hunting companies	Chief accountant, Photographic Survey Corp.
Kenneth M. Miller	Mgr. engrg., Lear, Inc.'s LearCal Div.	Mgr. special products
Jack Stadler	Dir. planning, Norden-Ketay Corp.	Secretary
Matthew James Leonard	VP-customer relations, Hycon Mfg. Co.	Hughes Products Div.
Clifford A. Faust	Dir. tech. services, Consolidated Electrodynamics Corp.	Asst. director
Leonard Pincus	VP, Airtron, Inc.	Lockheed Aircraft Corp.
Roy C. Irick	Head, applications engrg., Pacific Semiconductors, Inc.	Project engr., Navy Sidewinder
Charles C. Neighbors, Jr.	Coordinator, adv. and pub. rel., Greer Hydraulics, Inc.	News editor, Fleet Owner magazine
Leonard T. Donnelly	Mgr. component sales, Allen B. Du Mont Lab.	Admin. asst. to sales mgr., W. L. Maxson Corp.
Alan C. Morgan	VP-contracts, Northrop Div., Northrop Aircraft Corp.	Dir. customer relations
William J. Miller	Gen. mgr., Trans Electronics, Inc.	Regional sales mgr., Servomechanisms, Inc.
Edward L. Carlson	In charge of all information services, Oakite Products, Inc.	Adv. mgr.
Stanley J. Mannette	Asst. to mgr. of aviation sales, Cities Service Petroleum, Inc.	Mgr., Easton (Md.) Airport
Roy Baker Snapp	VP, Atomics Div., American Machine & Foundry Co.	Washington lawyer
Col. Ralph J. Watson (USAF, ret.)	Admin. and engrg. liaison rep., North American Aviation, Inc.	USAF legislative liaison office
Chandler C. Ross	VP, Aerojet-General Nucleonics, in addition to former position	VP-engrg., Aerojet-General Corp.
H. W. Davis	VP and comptroller, Aerojet-General Nucleonics	Asst. gen. mgr.
Albert J. Seifert	Mgr., mfg. engrg., Dalmo Victor Co.	Mgr. indus. engrg., Talon Mfg., Inc.
I. M. Berry	Gen. mgr., San Fernando Electric Mfg. Co.	VP-gen. mgr., Electron Products Inc.
James B. Williams	Dir., weapon system engrg., Philco Corp.	Chief engr.
Herman A. Affel	Dir., computer and control engrg., Philco Corp.	Chief engr., Govt. and Industrial Div.
Kenneth P. Martin	VP-gen. mgr., LeMaire Tool & Mfg. Co.	VP, National Automatic Tool Co.
B. W. Sauter	Gen. mgr., Westinghouse Electronic Tube Div.	Mgr. receiving tube operations
Dr. L. Malter	Chief engr. responsible for coordination of all engrg. programs, RCA	Chief engr.
D. H. Wamsley	Mgr., engrg. dept., RCA	Mgr. development, Semiconductor plant
John P. Day	Chief devel. engr., Kin Tel Div., Cohu Electronics, Inc.	U.S. Naval Electronics Lab.
Edward Wolf	Mgr., special products dept., Goodyear Aviation Products Div.	Special products dept.
Harry M. Stephey	Mgr., advanced sales, GE Missile Guidance Section	In Washington for Philco
Donald E. Davidson	Regional mgr., Australasia, Bendix International Div.	West Coast mgr.
Malcolm G. Douglas	Dir. sales and service, Montrose Div., Bendix Aviation	Sales mgr.
Charles J. O'Donnell	Gen. mgr., Reconnaissance Systems Div., Fairchild Camera and Instrument Corp.	Gen. mgr., Electrical Products Div.
Leonard E. Stillwill	Western Div. mgr., Goodyear Aircraft customer relations	Los Angeles dist. mgr.
Dexter Rosen	Admin. dept. mgr., Guided Missiles Div., Bell Aircraft Corp.	In chg. laboratory, Cleveland
Richard Houghton	Chief engr., Waters Mfg., Inc.	Sanders Associates
William H. Rowley	Mgr. military requirements, Jackson Div., Aeroquip Corp.	Mgr. Dayton office
Fred W. Schwier	Asst. to aircraft sales mgr., Jackson Div., Aeroquip Corp.	Aircraft sales engr.
Robert A. Brown	VP-gen. sales mgr., Borg-Warner International Corp.	Treasurer
John A. Carrington	Sales mgr., Monogram Mfg. Co.	Gen. sales mgr., Harvill Corp.
George D. Keller	Chief engr., Brooks Rotameter Co.	VP-gen. mgr., Penn Industrial Instrument Corp.
Vernon H. Vogel	Dir., electronics unit, Aeronautical Div., Robertshaw-Fulton Controls Co.	Motorola Research Laboratories
John W. Gillings	Dir., fluid controls unit, Aeronautical Div., Robertshaw-Fulton Controls Co.	Mgr., Standard Accessories Engineering
Murray Heyert	Mgr., Missile Products Sales, Avien, Inc.	In aircraft instrumentation
John J. Hensel	Admin. coordinator, Piasecki Aircraft Corp.	Arms Textile Mfg. Co.
Donald E. Heitzman	Asst. to vp-contract admin. and sales, Air Mod Corp.	Mgr., military sales div., Slick Airways
Manny Lenkowsky	Chief engr., Consolidated Diesel Electric Corp. of Canada, Ltd.	On engrg. staff, Stamford plant

AIRLINE

Robert J. Buck	Special adviser to pres., TWA	Supv. of flying, International Div.
John E. Parker	Chmn. finance committee, Slick Airways	Financial consultant
Pierre G. DeSautels	VP-passenger service, TWA	VP-overseas
Ross Angier	Dir., distribution consultant service, American Airlines	In cargo dept.
David A. Highman	Dir., airfreight sales, American Airlines	In cargo dept.
Robert E. Shippee	Asst. to gen. sales mgr., United Air Lines	Asst. dist. sales mgr., New York
Edward Gallagher	Asst. traffic dir., Northeast Airlines	Station operations mgr., New York
E. E. Swofford	Dir. for Pacific Northwest and Alaska, Pan American	Dir. for Japan, Korea and Okinawa
Dr. James N. Waggoner	Mgr., medical center, Los Angles, United Air Lines	Asst. dist. medical mgr., Chicago

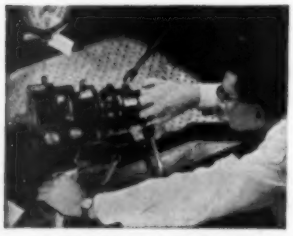
GOVERNMENT

Daniel G. Mazur	Mgr., Vanguard Operations Group, Patrick AFB, Fla.	Head, Electronic Instrumentation Branch
Thomas A. Rafferty	Dir. aeronautics, City of Long Beach, Calif.	Chief, airport and marine design sect.
John F. Wright	Resigned effective October	Compliance attorney, CAB

TEST EQUIPMENT

The Test Equipment Engineer is engaged primarily in the design of specialized missile check-out equipment. As missiles push the state of the art, test equipment must exceed the missiles in precision and reliability. Automatic programing, go-no-go evaluation, and automatic data processing add up to automation in missile testing.

This engineer is evaluating his design of a precision power supply—one of the building blocks that will be system engineered into a family of versatile matched missile and sub-system test equipment. Engineers work as individuals.



HYDRAULIC DESIGN

Excellent opportunities are available for the engineer to observe the performance of his design. Here, under the watchful eyes of its designer, a hydraulic power unit is undergoing adjustment and setting prior to severe testing at simulated high altitude conditions.

Many components, which a few months ago seemed almost impossible to design, are now being tested under the severe conditions required to qualify them for flight operation—and passing with flying colors.

STEERING INTELLIGENCE

Two Steering Intelligence Engineers discuss space allotment in a new guidance component. This close association of engineers with the "flying" equipment is typical of the Steering Intelligence Section. Engineers in this section are primarily and directly concerned with refining the guidance equipment to steer the missile with greater accuracy, at greater ranges and with simpler and more reliable electronic equipment and, consistently, with minimizing the cost. Work is actively in progress in every principal field from microwave equipment to inertial and instruments.

Bendix

PRIME CONTRACTOR FOR TALOS MISSILE

Offers more interesting and challenging job opportunities!

If you are interested in guided missiles, you will be especially interested in Bendix. As prime contractor for the important and successful Talos Missile, the job opportunities here cover the widest possible scope, and the opportunities for advancement are practically unlimited.

Here is a compact, hard-hitting organization backed by all the resources of the nation-wide Bendix Aviation Corporation—an organization dedicated to the design and production of the finest in guided missiles.

If you can accept a challenge, want an opportunity to grow with a leader in its field, and can accept the responsibility that goes with opportunity, send for the thirty-six-page book "Your Future in Guided Missiles". It gives the complete, detailed story of the function of the various engineering groups and the many job opportunities available for you.

Just fill out the coupon. It may help you plan a successful future in the guided missile field.

Bendix Products Division—Missiles
408 L. Bendix Drive, South Bend, Indiana

Gentlemen: I would like more information concerning opportunities in guided missiles. Please send me the booklet "Your Future In Guided Missiles".

NAME_____

ADDRESS_____

CITY_____ STATE_____

Union official urges U.S. action on phaseouts

In a press conference in Los Angeles, Roy W. Brown, v.p. of the IAM, recommended that the government establish a committee to develop an employment program to absorb aircraft and missile workers as their jobs are phased out.

He said the government is making a big mistake in anticipating disarmament without an employment program to cushion projected aircraft-missile phaseouts.

Brown contended the Southern California area would be the hardest hit by project reductions, since there are more than 300,000 persons directly engaged in aircraft-missile production and many thousands of others in secondary but directly related employment.

He estimated that the elimination of nearly all overtime beyond the 40-hour week, has cost IAM members an average of $17 per week in take-home pay.

Ryan ready to deliver first DC-8 engine package

Ryan Aeronautical Co. is scheduled to make delivery this month of the first DC-8 production engine "package" with full equipment except nose cowl.

After ground test runs at the Douglas Aircraft Co., the J57 engine will be returned to Ryan for installation of nose cowl complete with two large access doors. The other three engines of the first set are scheduled for delivery to Douglas late in October.

An intensive tooling program is in full swing in two production areas at Ryan's San Diego plant, one for power packages, the other for pylons. These will be used for several months until establishment of assembly lines on a long-term basis at Ryan's new Torrance division. Ryan has taken delivery on four engine buildup stands for the DC-8 work.

HONORS

Lt. Col. Frank E. Everest, USAF, has been named recipient of the 1957 Harmon International Trophy for Outstanding Aviator, for his outstanding pioneer work as Director of Experimental Test Flight at Edwards AFB, and as project director on the Bell X-2 research aircraft.

Malcolm D. Ross and **Lt. Comdr. Morton L. Lewis,** USN, will receive the Outstanding Aeronaut award for their accomplishment in piloting a manned balloon to the (unofficial) record altitude of 76,000 feet in connection with the concept of a laboratory in the stratosphere.

Dr. Dean Allen Watkins of Stanford University has been named recipient of the 1957 Electronic-Achievement Award of the Seventh Region, Institute of Radio Engineers for "his basic contributions in reducing noise in microwave electron tubes."

ENGINEERS— CAN YOU QUALIFY?

ELECTRICAL and ELECTRONIC ENGINEERS

with at least 2 years experience in:

Microwaves and Radar
- Antennas
- Beacons
- Receivers
- Transmitters
- Pulse Circuits

Gyro Development
Digital Computers and Data Processing
Servo-mechanisms and Feedback Systems
Fire Control Systems
Analog Computers
Military Specifications
Electronic Circuitry

NUCLEAR ENGINEERS and PHYSICISTS

with experience in the
Control
Metallurgy
Physics
Instrumentation
of NUCLEAR REACTORS

MECHANICAL ENGINEERS

with at least 2 years experience in:

Gyro Development
Fire Control Systems
Military Specifications
Product Design and Packaging of Electro-mechanical Devices

For details write Philip F. McCaffrey at:

FORD INSTRUMENT CO. DIVISION OF SPERRY RAND CORP.

31-10 Thomson Ave.,
Long Island City 1, N. Y.
DIVISION OF SPERRY RAND CORP.

If you are a skilled engineer searching for security and challenging work . . .

. . . Rohr is looking for you.
Rohr's large commercial backlog and wide diversification of long-range programs offers reward and permanency to a select group of experienced aircraft *Design and Stress Engineers.*

World's Largest Producer of Ready-To-Install Power Packages for Airplanes

ROHR AIRCRAFT CORPORATION

Chula Vista and Riverside, California

Write Rohr today! We will answer at once and arrange interview at mutual convenience. Address J. L. Hobel, Industrial Relations Manager, Rohr Aircraft Corporation, Chula Vista, Calif., Dept. 000

THE BULLETIN BOARD

Undisplayed Advertising: $2.00 per line, minimum charge $6.00. Cash with order. Estimate 30 capital letters and spaces per line; 40 small lower-case letters and spaces per line. Add two lines if Box Number is included in lieu of advertiser's name and address. **Displayed Advertising:** $20.00 per column inch. Space units up to full page accepted in this section for classified-type advertising. Forms close three weeks preceding date of issue. Address all correspondence to Classified Advertising Department, American Aviation Publications, 1001 Vermont Ave., N. W., Washington 5, D. C.

Help Wanted

BRITISH AIRCRAFT ENGINE Manufacturer requires for U.S. Subsidiary graduate aeronautical engineer (or equivalent qualifications) to assist divisional manager and to prepare technical studies for airlines. Successful applicant will be based in Washington, D.C. but required to travel. Please reply stating age and salary required to Box 124, AMERICAN AVIATION Magazine, 1001 Vermont Ave., N.W., Washington 5, D.C.

TECHNICAL EDITOR

For

AMERICAN AVIATION

EXCELLENT OPPORTUNITY for young engineer or experienced industry technician with background in aircraft accessory or equipment field. Must be able to pinpoint significant new developments in aircraft equipment, report them in AMERICAN AVIATION magazine.

Write: Robert H. Wood, Editorial Director, American Aviation Publications, 1001 Vermont Ave., N.W., Washington 5, D. C.

Immediate Delivery

We stock, overhaul, and install

WRIGHT PRATT & WHITNEY

R1820 -202, -56, -72 **R1830** -73, -92, -94

R2000 R1340 R985

and our most popular DC3 engine

R1830 - SUPER - 92

ENGINE WORKS

Lambert Field Inc. St. Louis, Mo.

For Sale

FOR SALE BY OWNER
immediate delivery

Lockheed PV-2's	$16,500 up
Beechcraft AT-11's	4,750 up
Beechcraft C-45F's	8,750 up
Grumman TBM-3E	6,000

Trades accepted

E. D. WEINER, 1270 Ozeta Terrace, Los Angeles 46, Calif. Phone OLympia 2-1007 24 hours

FOR SALE

C-47s DC-3s

Also

Repair—Overhaul—Modification

VOLITAN AVIATION, Inc.

1280 Pierce St., Pacoima, Calif.

Phone EM-0-1283

C-46 AIRCRAFT

IMMEDIATELY AVAILABLE

SALE OR LEASE

Fully Licensed

48,000 Pound Gross Weight

Passenger or Cargo

Can Convert to CW-20

and Your Specifications

International Aircraft Maintenance Company Hangar 3 Lockheed Air Terminal Burbank, Calif.

Thornwall 26164 Cable: Interair Stanley 75378

NON-BREAKABLE

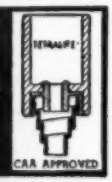
TETRALITE

SPARK PLUG TERMINAL SLEEVES

FOR THREADED OR STANDARD LEADS

J. E. MENAUGH COMPANY

515 WASHINGTON BLVD. CHICAGO 6, ILL.



CAA APPROVED

HANGARS

100% Financing

We offer hangars to fill any requirement with financing up to 100%. Get full details before contracting!

ANDERSON STRUCTURAL STEEL CO.

1700 Sawtelle Blvd., Los Angeles 25, Calif.

THE

SKYMOTIVE

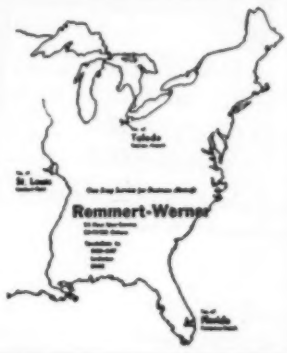
STORY

Complete RAMP SERVICES

ALL GRADES of GASOLINE and JET FUEL

skymotive

O'HARE FIELD CHICAGO



AN HARDWARE & FITTINGS

Stainless, Aluminum, Brass, Steel. All sizes—immediate delivery from world's largest shelf stock. Buy direct from manufacturer. Lower prices—Quicker service. Send for free wall charts showing complete line of AN Fittings and Hardware.

COLLINS ENGINEERING CORPORATION

9050 Washington Blvd. Culver City, Calif.

AVIATION FACTS AND FIGURES

New 1957 edition. An Official Publication of the Aircraft Industries Association. $1.00 per copy. Complete, authoritative. Published by American Aviation Publications, 1001 Vermont Avenue, N.W., Washington 5, D.C.

NAVCO inc.

Lambert Field
St. Louis, Mo.
PErshing 1-1710

has factory fresh, dated

Deicer Boots

for

DC3 Lodestar Beech

WORLD'S FOREMOST

LODESTAR

SERVICE CENTER

Inspection	Radar
Maintenance	Interiors
Instrumentation	Engine Change
Modification	Exteriors
Overhaul	Radio

PacAero Engineering Corp.

(Formerly Lear Aircraft Engineering Division)

Santa Monica Airport, Santa Monica, California

Builders of the Incomparable Learstars

BOOKS

Glossary of Aeronautical Definitions. *(English-German / German-English). By Roderich Cescotti. Published by Hanns Reich Verlag, Munich, Germany. 270 pp. Price, 6.80 marks ($1.62).*

This publication is useful not only to those who use the German language but also to aviation students who do not speak German. Definitions are given in English and there is also a German translation. The glossary presents a systematic compilation of definitions which have been formulated either by the International Civil Aviation organization or the British Standards Institution during the postwar years. It contains more than 3,500 basic definitions and cross-references.

Famous Fighters of the Second World War. *By William Green. Published by Hanover House, New York. 128 pp. Illustrated. Price $3.95.*

Book provides detailed histories of 17 famous fighter aircraft used by Great Britain, the U.S., Germany and Japan. Included are accounts of the first jet fighter—Messerschmitt's ME 262—and the Me 163 rocket fighter. U.S. aircraft include Curtiss P-40, Lockheed P-38, Republic P-47 and North American P-51.

AMERICAN AVIATION

PUBLISHING CORPORATION . . . American Aviation Publications Inc.: Principal offices at 1001 Vermont Ave., N.W., Washington 5, D. C. Wayne W. Parrish, president; Leonard A. Eiserer, executive vice president and secretary-treasurer; Albert H. Stackpole, Eric Bramley, Robert H. Wood, Fred S. Hunter and Robert R. Parrish, vice presidents; Louis C. James, Ass't Secretary Treasurer.

OTHER PUBLICATIONS AND SERVICES . . .

AVIATION DAILY: Overnight service for the entire industry. $200 per year.

WORLD AVIATION DIRECTORY: Twice-yearly listing of products, people and organizations. $9, U.S.A., Canada. $10, Overseas.

OFFICIAL AIRLINE GUIDE: Monthly publication of airline schedules, fares. World-Wide Edition: $19.50 per year everywhere. North American Edition: $13.50 per year. U.S.A. $14, Canada, $15, elsewhere. Published from 130 N. Clark St., Chicago 2.

MISSILES AND ROCKETS, MAGAZINE OF WORLD ASTRONAUTICS: For those in missiles and rockets industry and satellite science. $8, one year; $12, two years—U.S.A., Canada, $9, one year; $14, two years—Overseas.

AIR TRAFFIC NEWS (INCORPORATING AIR TRAFFIC DIGEST): Daily rates and tariff news. $200 per year.

AIRPORTS: Weekly newsletter for airport officials, suppliers and services. Air mailed Fridays, $25 per year.

AIR INFORMATION DIVISION: Specialized service that digests, for the scheduled airlines, their timetables, fares and charges. 595 Broad Ave., Ridgefield, N. J.

WHO'S WHO IN WORLD AVIATION: First reference work of its kind. Over 2,200 biographies of aviation's leaders. 345 pp. De luxe bound. $10 per copy, p.p.

AIRCRAFT YEAR BOOK: (Official Publication of Aircraft Industries Association.) Comprehensive reference of aviation industry products, sales, technical progress. $6 per copy, p.p. anywhere.

AVIATION FACTS AND FIGURES: (Official Publication of Aircraft Industries Association.) Accurate handbook of authoritative statistics on all phases of aviation. $1 per copy, p.p. anywhere.

AIR CARGO MAGAZINE AND OFFICIAL GUIDE: First monthly publication of its kind serving all phases of cargo industry. $10 per year, U.S.A., Canada. $11.50 per year. Overseas. Published from 134 N. Clark St., Chicago 2.

ARMED FORCES MANAGEMENT: Monthly magazine. Provides interchange of information between industry and Armed Forces on latest techniques and developments in management field. $2, one year; $3 two years—U.S.A., Canada, $3 one year; $5, two years—Overseas.

ADVERTISERS INDEX

Air Associates, Inc.	74
AiResearch Aviation Service Co., Div.—The Garrett Corp.	15
AiResearch Manufacturing Co., Div.—The Garrett Corp.	26, 27
Allison Div., General Motors Corp.	70
Aro Equipment Corp., The	54
Avco Manufacturing Corp.	77
B & H Instrument Co., Inc.	45
Bendix Aviation Corp.	
Eclipse-Pioneer Div.	14
Montrose Div.	52
Pacific Div.	12
Scintilla Div.	100
Bernco Engineering Co.	35
Boeing Airplane Co.	36
Braniff International Airways, Inc.	86
Bristol Aeroplane Co., Ltd.	10, 11
Bulletin Board (Classified)	108
Canadair Ltd., a Sub.—General Dynamics Corp.	20
Chance Vought Aircraft, Inc.	18
CONVAIR, a Div.—General Dynamics Corp.	1
Curran Corp., The	44
Curtiss-Wright Corp.	51
Defense Procurement Representatives, Inc.	34
Delta Air Lines	88
Douglas Aircraft Co., Inc.	56, 57
Electric Storage Battery Co.	39
EMPLOYMENT SECTION	
Bendix Aviation Corp., Bendix Products Div.	106
Ford Instrument Co., Div—The Sperry Rand Corp.	107
Rohr Aircraft Corp.	107
Esso Standard Oil Co.	61
Fairchild Engine & Airplane Corp.	3
Flightex Fabrics, Inc.	34
Ford Instrument Co., Div.—The Sperry Rand Corp.	55
B. F. Goodrich Aviation Products, Div.—The B. F. Goodrich Co.	30
Grumman Aircraft Engineering Corp.	16, 17
Hamilton Standard Div., United Aircraft Corp.	93
Hollywood Professional Bldg.	74
Industrial Acoustics Co., Inc.	72
Jeppeson & Co.	74
Kaar Engineering Corp.	37
Kraeuter & Co., Inc.	64
Laminated Shim Co., Inc.	19
Hotel Lexington	82
LaVezzi Machine Works	76
Lockheed Aircraft Corp.	28, 29
M. C. Manufacturing Co.	60
Marman Div., Aeroquip Corp.	65
Martin Co., The	25
McDonnell Aircraft Corp.	40
Messaglia Hotels	87
Menasco Manufacturing Co.	97
Miller Dial & Name Plate Co.	37
North American Aviation, Inc.	42
Phillips Petroleum Co.	112
Pratt & Whitney Aircraft Div., United Aircraft Corp.	96
Puritan Compressed Gas Corp.	82
Purolator Products, Inc.	6
Radio Corp. of America	62
Resistoflex Corp.	2
Ralph C. Robinson Co.	53
Royal Metal Manufacturing Co.	38
Ryan Aeronautical Co.	48
Shell Oil Co.	98, 99
Short Brothers & Harland, Ltd.	76
Simplex Piston Ring Manufacturing Co.	103
Solar Aircraft Co.	58
Southwest Airmotive Co.	75
Roland Teiner Co., Inc.	81
Temco Aircraft Corp.	111
Townsend Co., Cherry Rivet Div.	4
Trans World Airlines, Inc.	78
Vickers, Inc., Div.—Sperry Rand Corp.	101
Wasau Iron Works, Inc.	103
Weber Aircraft Corp.	8
Weltronic Co.	41
Wm. R. Whittaker Co.	47

EN ROUTE

by Wayne W. Parrish

'Side trips' to France, Canada and Mexico

I'M GOING TO INTERRUPT my Australian series for just this one issue to get caught up with a few trips I've made since returning from Australia and New Zealand at the end of last March.

For example, take the trip to Paris for the big air show there in May. Ten years ago I never would have dreamed that I'd be playing host to a big boat party on the Seine in the heart of Paris, but that's what happened.

Thanks to Jean-Marie Riche, AMERICAN AVIATION's very astute and able representative in France, our AAP outfit hired a two-deck excursion boat, the G. Borde Fretigny, for a reception to which many French, British and American aviation people were invited. A couple of hundred showed up and the champagne and extras made it quite a party as we sailed up and down the famous river past such famous places as Notre Dame Cathedral.

Four Parisian cops directed auto and taxi traffic at the Quai d'Orsay where we all boarded the boat. A group of French aircraft manufacturers were having a dinner at the famed Tour d'Argent restaurant up the Seine so we docked the boat near the restaurant to let them off. One amusing incident occurred when four English tourists hopped on our boat just before the ramp was pulled up, thinking our boat was the regular Seine boat service. They were plenty embarrassed when they found out it was a private party but we gave them champagne and made them feel at home and they'll never forget that trip, for sure.

Nice sendoff

Then early in July I took off on a long-planned trip to Montreal to fly Trans-Canada for the first time across that great country to Vancouver. D. V. Richardson, d.s.m. in New York, and Dan De Guerre, area sales manager, gave me a fine sendoff at the Canadian Club in New York before boarding a TCA Viscount at Idlewild. In Montreal I was met by my old pal and traveling companion Rod MacInnes, TCA's director of public relations and one of the savviest birds in his field on the globe.

I left for the west on an early morning Viscount which stopped at Toronto and on board was John Truran, manager of engineering and sales for Jarry Hydraulics, Montreal, and a fan of this page. Truran recognized me from the photo I keep on this page.

It's quite a nice trip across Canada, lots of good scenery and lots of water as we crossed the lakes. There was a routine stop at Port William and then on to Winnipeg, the largest city in both North and South America I had never visited. Don Aiken, TCA public relations, took me through the maintenance shops (TCA has 1,850 people in Winnipeg) and then we were joined by Roy Lockhart, station manager and Rene Giguerre, check pilot, for a couple of drinks at a fine new spot called the Paddock. Then on to dinner at Pierre's, a very excellent place to dine where the popovers and steaks are AA-1.

Winnipeg is quite a place (population 400,000) with some attractive residential areas. But in winter it can get pretty cold —58 below zero is lowest recorded—and in summer pretty hot—highest 108 recorded—so I was glad it was just pleasant in early July. Out there hamburgers are known as Nips, taken from Salisbury Nips, an English rendition of just chopped-up steak.

I hadn't been in a Viscount for some time and found it very pleasant, neither as noiseless or vibrationless as some of the U.S. advertising claims, but very favorable in those directions. TCA's Aerotherm seats are very comfortable and I like the fold-down tray arrangement which is a Viscount feature. From those big windows the views of the wheat fields and northern lakes were excellent.

I got on an early evening flight with Capt. Allan Spratt running the show and headed for Calgary but some thunderstorms diverted us to Edmonton where we waited for an hour. The allegedly air-conditioned coffee shop there was so filled with vile, foul, stale air that I couldn't remain more than a minute (wonder why somebody didn't open a window?). In due course we went on to Calgary and I was no end impressed by the very excellent modern terminal in that progressive city. It's the finest in Canada and one of the best on the globe for a city of that size.

I made note that there are now airline hotels at or near the airports of Winnipeg, Edmonton and Calgary.

Arrived in Vancouver pretty late due to the diversion but managed to sleep some on the airplane. Had a good room at the fine Vancouver Hotel and then out to the airport for a noon takeoff for Victoria, another spot I had never been to before. Don McLaren, the Canadian WW I ace and a founder of Canadian Airways, now with TCA in Vancouver, met me at the airport and after a 45-minute hop over beautiful country and water I landed at Victoria to be met by Wallace G. Courtney, traffic and sales manager there.

COURTNEY

Although Victoria is on an island, it's the capital of British Columbia and is a favorite tourist spot for both Canadians and Americans. More English in atmosphere than most Canadian cities, and dominated by one big (and somewhat stuffy) hotel, the Empress, Victoria is a place to visit once, at least. Thanks to Wally Courtney's magnificent hospitality, I was able to drive all over the area and see everything (including superb scenery) before taking off on the short hop to Seattle where Bert Chapman of TCA met me and drove me into town to the Olympic, one of my favorite hotels.

Living high on hog

After visits to aircraft companies in Seattle and Los Angeles, I went on Western's de luxe pre-inaugural to Mexico City and lived high on the hog down there at the swank Continental Hilton Hotel. Western put on a first-class show, both in Los Angeles and Mexico and the guests couldn't have been treated better.

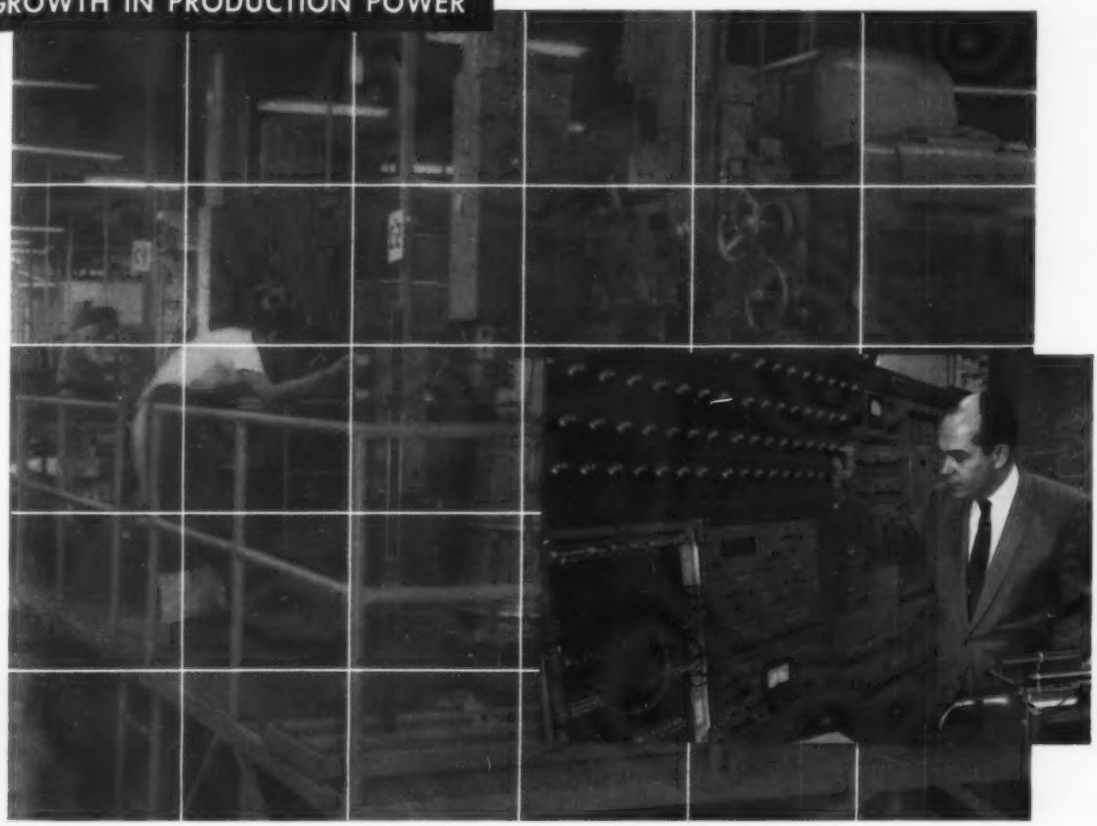
WWP's dinner partner at the Western Airinaugural banquet in Mexico was Sra Alexandra Guzman. Any questions?

Saw a lot of old friends including General Alberto Salinas Carranza, director general of civil aviation who made some flattering remarks about me at the state banquet; Pepe Rojas, CMA's director of public relations, and Doug Stockdale, ex-CMA, ex-Braniff and ex-TWA, now Western's knowledgeable manager for Mexico. Hadn't been down there since about 1948, and was wide-eyed at all the new modern buildings. Some excellent restaurants, too. Tough about the earthquake; I was glad I was back in Washington when it happened.

Western should do well on its new route. If the inaugural was any indication, it will. A few days after we arrived, Capt. Eddie Rickenbacker and entourage came on the scene with Eastern's inaugural from New Orleans. East finally meets west, so Rick said, and the photographers snapped pictures of Rick shaking hands with Terry Drinkwater, Western's president. A gay time was had by all.

IN ENGINEERING THE BEST OPPORTUNITIES ARE IN AVIATION • IN AVIATION THE BEST OPPORTUNITIES ARE AT TEMCO

GROWTH IN PRODUCTION POWER



At Temco GROWTH tells the story

Growth — in production and technical computing capacities, for example—tells the Temco success story.

Through the acquisition of new and advanced production machines, such as six large Bullard turret lathes installed recently, Temco's manufacturing capabilities have increased manyfold during the past few years.

Analog computing equipment, capable of saving thousands of engineering man hours, has been added to meet the needs of Temco's expansion in research fields.

Greater productivity is a clear index to Temco's growth in engineering skills, increasing contracts and significant progress in the development of Temco-designed weapons systems. The engineer seeking the challenge of a growing organization . . . the prestige of a soundly established company . . . will find *his* opportunity at Temco!

TEMCO

AIRCRAFT CORPORATION • *Dallas, Texas*

Mr. JOE RUSSELL, Engineering Personnel
Room 104-L, Temco Aircraft Corp., Dallas, Texas

Please send me complete details of the Temco story of unusual opportunities for experienced engineers. I am especially interested in_____

NAME _____

ADDRESS _____

CITY _____ STATE _____

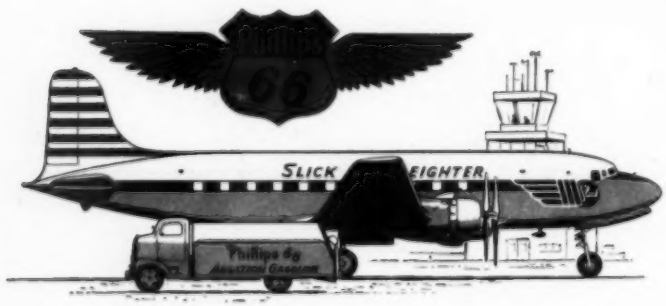
IN ENGINEERING THE BEST OPPORTUNITIES ARE IN AVIATION • IN AVIATION THE BEST OPPORTUNITIES ARE AT TEMCO

One in a series about users of Phillips 66 Aviation Products

Phillips 66 LOOKS AHEAD with SLICK

Slick prepares for the future with a huge, growing fleet of all-modern air cargo carriers. These are teamed with fast trucks to speed cargo from shipper to airports, from airports to customers. Slick serves the nation's shippers with 280 tons of combined lift capacity, 100 scheduled flights per week, rates comparable to surface charges and a unique $1 minimum tariff. Slick has 27 stations in the United States, 60 interline agreements throughout the world.

A Slick Airfreighter refueling with Phillips *66* Aviation Gasoline at Wichita Municipal Airport. Wide cargo doors (right) provide ample room for loading Sky-Vans aboard a Slick Airfreighter. Sky-Van, a lightweight aluminum container, was devised by Slick Airways for the transportation of household furnishings by air.



● Today, Phillips 66 Aviation Gasoline gives dependable, efficient performance to Slick and other leading air lines, as well as to the military air services.

In step with the future, Phillips is a leading producer of *super performance* Jet Fuels for the latest designs in turbo-props and jets. And Phillips research continues to lead the way for development of fuels for the aircraft of tomorrow.

AVIATION DIVISION • PHILLIPS PETROLEUM COMPANY • BARTLESVILLE, OKLAHOMA